Vol. XVIII. Part 12.

[Registered at the General Post Office, Melbourne, for transmission by Post as a Newspaper.]

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The Journal of the Department of Agriculture of Victoria, Australia.

December, 1920.

PRINCIPAL CONTENTS

New Zealand Flax

Standard Herd Test—Quarterly Report

Small Fruit Culture

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OF

THE DEPARTMENT OF AGRICULTURE,

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CONTENTS.—DECEMBER, 1920.

		PAGE
New Zealand Flax (continued)	*J. Farrell, Orchard Supervisor*	705
Small Fruit Culture (continued)	*A. A. Hammond*	717
Standard Herd Test—Quarter ended 30th September, 1920		733
Farm Notes for November—Experimental Work at State Research Farm, Werribee	*G. S. Gordon*	746
Bordeaux Mixture—Should it be Acid or Alkaline	*F. de Castella*	749
Type : and Burnley Egg-Laying Competition ...	*A. V. D. Rintoul, N.D.D.*	754
Specifications for a Brick and Concrete Trough	*J. Wilson*	756
Stallions Registered for 1920-21 (2nd List)		758
Orchard and Garden Notes		765
Reminders for January		767

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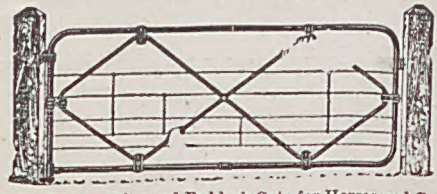

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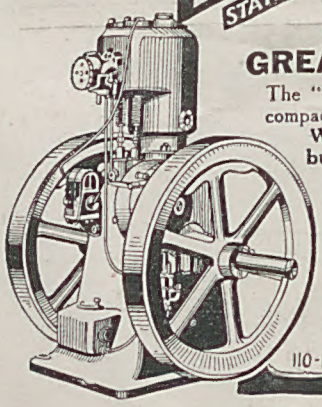

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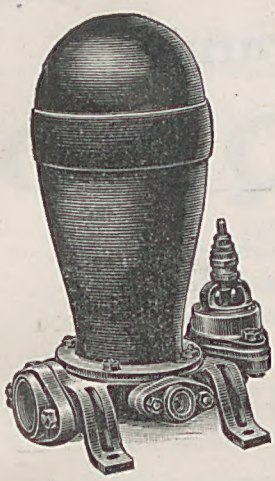

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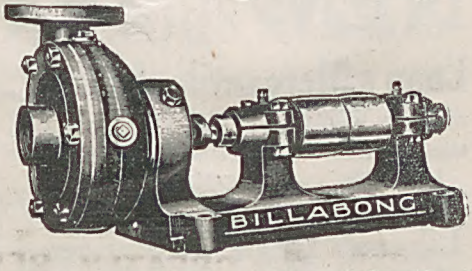

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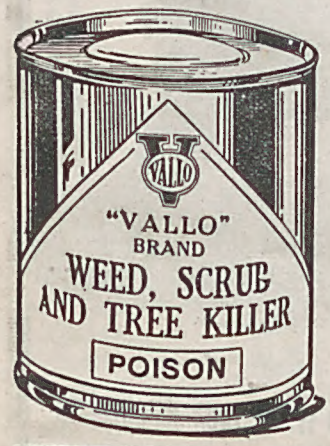

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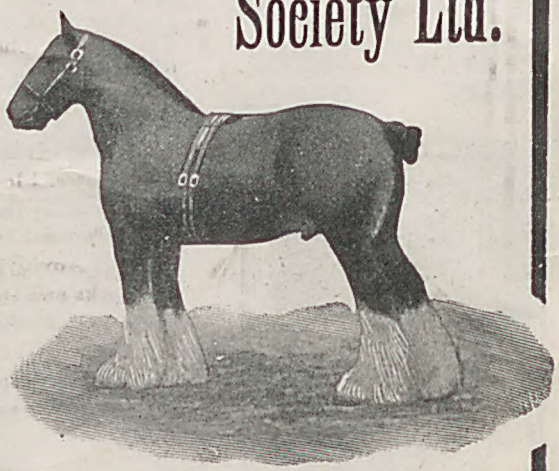

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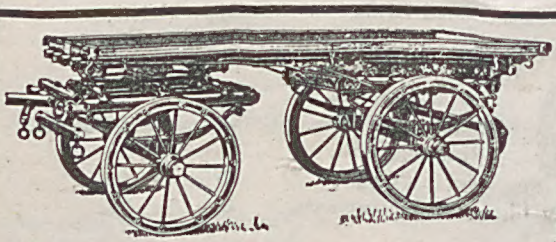

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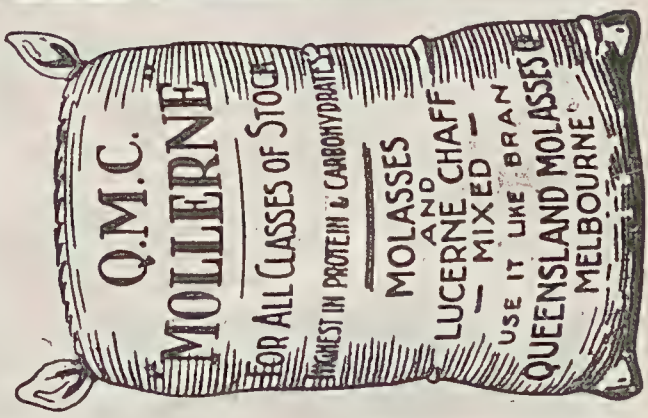

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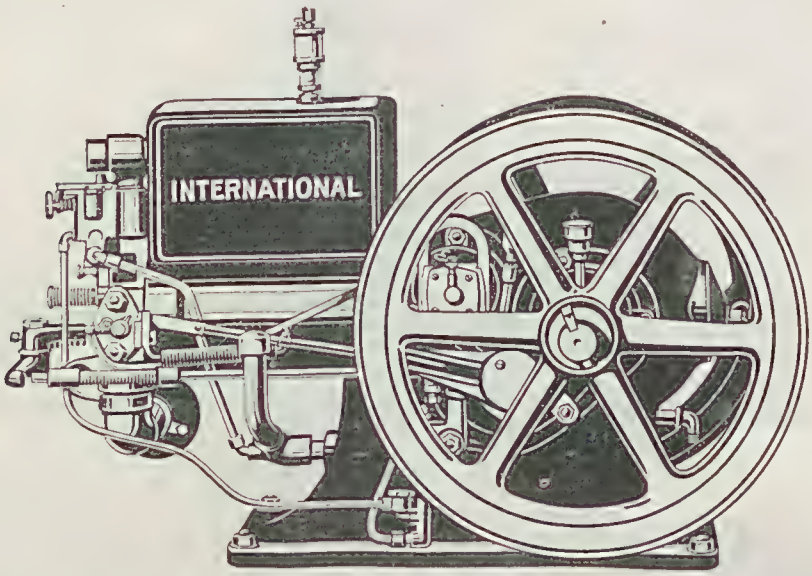

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Vol. XVIII. 21st December, 1920. Part 12.

NEW ZEALAND FLAX.

(Continued from page 671.)

By J. Farrell, Orchard Supervisor.

Varieties.

Although there are many varieties of Phormium, only three showing marked points of difference are distinguishable to the uninitiated and casual observer. These consist of what is commonly termed swamp flax with comparatively broad leaves of drooping habit, the hill variety with rather narrow leaves of stiff and upright growth, and a variegated variety used for garden ornamentation, &c. To the student of botany, however, many minor variations are apparent, and that these influence the nature of the fibre produced is vouched for by practical flax millers and rope spinners connected with the New Zealand hemp industry. It may be stated, nevertheless, that the fibre produced from the Emerald Phormium this year, some of the plants being of drooping habit, while others are of stiff and upright growth was of excellent colour and of uniformly good quality.

Hector remarks that—

"The Phormium plant is highly variable, and therefore amenable to improvement by culture, but no attempt having been made to describe these varieties in a scientific manner, great confusion exists among the names. Professor Hutton points out that much of this confusion appears to have arisen by supposing that those varieties which were considered nearly alike by the Maoris, and for which they sometimes used indifferently the same name, are really botanically allied; whereas the Maori system of classification was founded on one feature alone, namely, strength of fibre. All those varieties the fibre of which was so strong as to enable them to draw it out in long ribbons, without breaking, they called 'Tihore'; while those inferior kinds which had to be soaked and

scraped with a shell in order to get length of staple, were called 'Haro'; and it is evident that many varieties would thus be grouped together, which under a different arrangement would be more widely separated. Thus the paretaniwha, or yellow hill-flax, is sometimes called a 'Tihore,' although it is much more nearly allied to the common swamp-flax, and is very different from the 'Oue,' which is the commonest Tihore.

The colour of the leaf, and more especially of the mid-rib and margins, has been taken almost exclusively as the distinguishing mark of the different varieties; but this is altogether unreliable, for not only does the shade of colour of the margin differ in old and young leaves, but often different leaves of the same plant, and

Plate 11.—Common Swamp Flax Plant—growing in St. Kilda Road Plantation.

even different parts of the same leaf have differently coloured margins. In distinguishing varieties, therefore, habit of growth, shape of leaf, size of flower-stalk, and shape of the seed-pod are to be considered as of more importance than mere colour of margin, or even colour of leaf."

Plate 11 shows a typical plant of the common swamp variety, which by its broad drooping leaves illustrates its habit of growth. Because of its pliable leaf this is the variety mostly grown by orchardists for use in tying up blackberries, loganberries, &c. Binder twine spun from the fibre is also extensively used for the same purpose.

The plant appearing in Plate 12 is one of the hill variety, with hard, stiff leaves and of upright growth. Both these varieties thrive well in Victoria, and produce good fibre.

Professor Hutton from his personal observations has suggested the following classification:—

"*Harakeke* (Common Swamp Flax).—Leaves coarse, loose, drooping, points generally blunt; flower-stalk large—11 feet to 14 feet high, and 1 inch to 2 inches in diameter. Pod short, erect. Grows almost everywhere, but attains its largest size (14 feet or 15 feet) on rich alluvial soil, by the banks of streams. Many sub-varieties are found, some with leaves dark blue-green above and glaucous below, and some pale olive-green or bronze. Some varieties have also the butts of the leaves coloured with red for some distance up, while others are yellowish-green almost to the very base. When the plant is stunted the flower-stalk is also small, and the best characteristic is the blunt point to the leaf.

Plate 12.—Hill Flax Plant—growing in St. Kilda Road Plantation.

Paretaniwha (Yellow Hill Flax).—Leaves erect, slightly drooping at the tip, yellowish-green, generally with red or orange margins, slightly glaucous below, point acute. Flower-stalk small, 4 feet to 8 feet high, and ½ inch to 1 inch in diameter. Pod short, erect; fibre very good, soft, and glossy. Plant seldom more than 5 feet or 6 feet height; grows generally on clay hills.

Tihore.—Leaves stiff, erect, narrow, never drooping at the tip, olive-green, glaucous below, points very acute—or cuspidate, pink at the butt. Flower-stalk 9 feet to 10 feet high, and 1 inch in diameter. Pod erect or inclined; seldom flowers, and still more rarely seeds. Plant seldom over 6 feet in height. Grows in rich, dry, alluvial land, never in swampy places. I have never seen it except where planted by the Maoris. I have here applied the name

of that variety called 'Tihore' by the Maoris throughout the Waikato, and which is probably identical with the 'Oue' and 'Tapoto.' It is best distinguished by its narrow, tapering, sharp-pointed leaves, and erect, close habit. It grows so thickly together that I obtained 186 sets for planting from two bushes."

The different *colourings* in the leaves is regarded by some as the best means of determining the varieties. Mr. Hirst once planted for the "Patea Flax Company" 25 acres of land with six varieties which he described as follows:—

Oue	..	Red edge.
Atirdukawa	..	Light; bronze edge.
Korako	..	Black edge, light colour in back of leaf.
Huhiroa	..	Black; narrow edge.
Atewheke	..	Scarlet edge.
Tihore	..	Orange edge and keel.

Even the most practical operators connected with the New Zealand flax industry often experience difficulty in identifying the varieties, whether following on the lines suggested by Professor Hutton or those described by Mr. Hirst. The confusion, formerly existing because of the Maoris' classification, which is founded on the strength of the fibre alone, having been recognised, has become intensified by the production of great numbers of seedlings; these, because of cross-fertilization, &c., show many minor differences in sub-varieties. In order to overcome this difficulty and maintain the best fibre-producing sorts, intending planters should establish nurseries of selected stock plants, and from the divisions of the roots of these establish and extend the planted areas. Not alone does planting the set insure the perpetuation of the desired variety, but the fan being usually stronger than that of the two-year-old seedling, develops into a large bush quicker than the latter.

Cutting and Gathering the Green Leaves.

Provided the bushes make satisfactory growth, the field of flax is ready for cutting in four years after being planted, and every three years after there is a new crop of leaves ready to cut. Each bush consists of a number of fans clustered together, and, as each fan produces its quota of leaves, it is obvious that the larger the number of fans giving the greatest length of leaf, the heavier the yield, and consequently the more remunerative the field. Some New Zealand authorities state that from 12 to 18 tons of green leaves per acre are gathered from uncultivated land, but from properly cultivated plantations, according to experiments, they aver that upwards of 50 tons per acre could be gathered.

As the fan develops the outside leaves wither and die, and are therefore of no use for fibre. Some experts advocate gathering the Phormium annually by cutting the outside leaves of the fans low down and allowing the younger centre leaves to remain until the next year. They state that those who adopt this system, as well as gathering an annual crop, enable the plants to make much more rapid growth. The method most generally practised, however, is, as illustrated in Plate 13, to cut off the whole of the green leaves at once, and every three years. This method was adopted in Nobelius' flax fields this year, and, as other illustrations will show, the bushes subsequently made strong growth. In

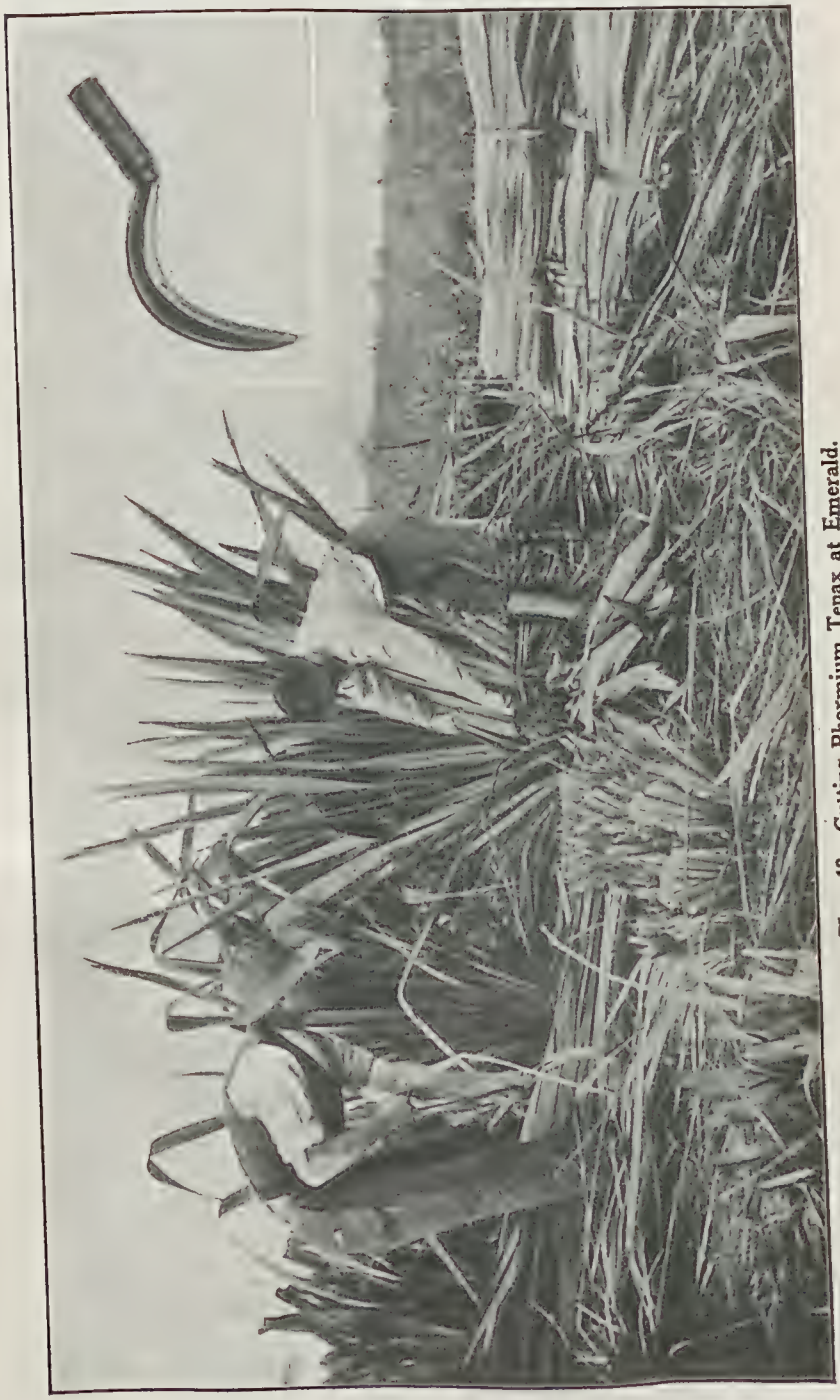


Plate 13.—Cutting Phormium Tenax at Emerald.

harvesting the Phormium, two men work together, one cuts the green leaves while the other binds them into bundles or sheaves of a size suitable for convenient handling. The hook or knife appearing above the picture illustrates the kind of implement used in flax-cutting. The wooden handle is 4 inches and the blade over 8 inches long. A keen edge

Plate 14.—Method of Binding the Sheaves.

is maintained, and when placed against the leaves, as depicted in the illustration, the knife is drawn upward at an angle of about 60 degrees from the vertical. The leaves are much more easily severed in this way than by means of a horizontal cut. The leaves are severed at the point where the green portions terminate, as the fibre in the butts or soft thick parts below that point being invariably coarse and of inferior quality,

Plate 15.—Section of a Flax-field from which the Phormium has been Gathered.

and, if stripped and maintained with the better class of fibre above, it would tend to lower the commercial value of the product.

In binding the sheaf a single green leaf is used in making the band. One band is regarded as sufficient for sheaves up to about 4 feet in length, but in the case of longer ones two bands are employed. The lengths of the different sheaves and the method of binding them respectively are depicted in Plate 14. The bands are securely tied to insure the bundles of leaves remaining intact during loading and in transit to the mill, as they are usually subjected to rather rough handling.

As the Phormium is cut and bound the sheaves are stacked near the roadways where they are convenient for loading and carting to the mill. The passages which existed in the nurseries of Messrs. C. A. Nobelius and Sons at Emerald, were retained for this purpose when the flax fields were being planted. The necessity for these roadways is obvious, because wheeled vehicles in passing over the flax area in hauling the green Phormium to the mill would, even when travelling with the rows, injure or destroy many of the plants.

At Emerald, as the bushes become thoroughly established, cultivation ceases, but if continued with a view to conserving capillary moisture, as the Phormium like this, heavier returns of green leaf would be obtained. It has been previously mentioned that as the fans develop the outside leaves gradually wither and die, but retain their hold on the stems. In cutting the Phormium these are not severed, but allowed to remain in the horizontal or pendulous position which they assume. In this way the old leaves serve as a mulch and protect the soil from the direct rays of the sun during summer, and they also assist in keeping down weeds. Plate 15 shows a section of a flax-field from which the green Phormium has just been removed, with the dead leaves remaining as explained. The fibre of the dead and air-dried leaves being much inferior in quality to that obtained from the green Phormium is consequently not as suitable as the latter for rope-making. Neither are the dead leaves amenable to treatment by the stripping machine, but, if a cheap and effective chemical process of extracting the fibre could be discovered, it might be used for making paper-pulp for which it is most suitable.

The utilization of *Phormium tenax* for paper-making has for many years engaged attention, and the Melbourne *Herald* recently published a report from its New Zealand correspondent as follows:—

> "As long ago as 1860 the demand for paper-making materials had made New Zealanders look about for sources of 'pulp' in the colony though the incentive was perhaps rather business enterprise than the heavy pressure of short supplies. Among some old newspapers recently secured by the City Librarian, Mr. H. Baillie, are copies of the *Wellington Independent* of June, 1860. In one issue it is stated that New Zealand flax fibre had been made into excellent paper, and a profitable and unfailing market would be found for flax pulp if the machinery could be set up.
>
> It is remarked that the small amount of capital in the country forbade local speculation of sufficient magnitude. But an English company 'might purchase a few thousand acres of our swampy land at 10s., and even turn the flax in its wild state to most market-

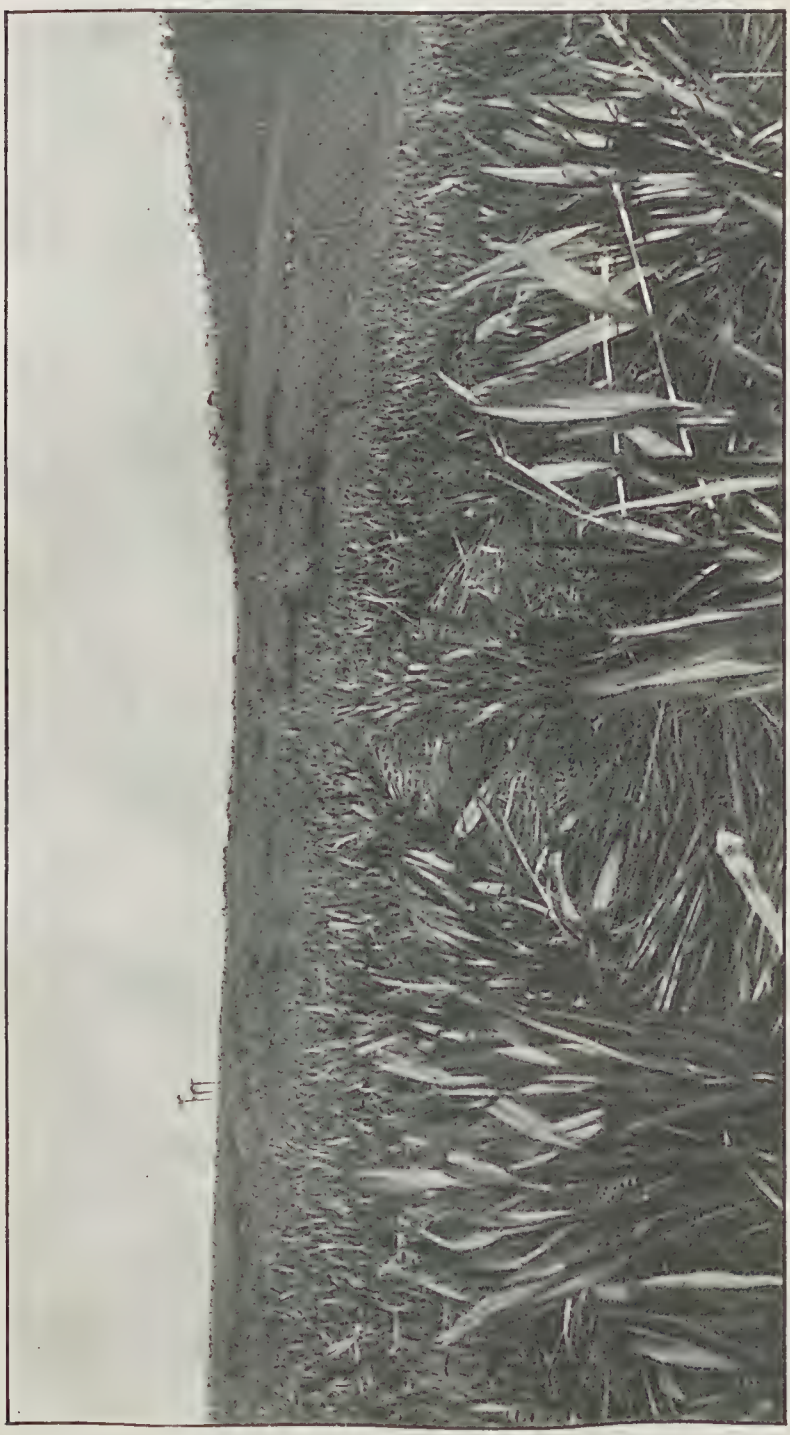


Plate 16.—Three Months' Growth After Cutting.

Plate 17.—Nine Months' Growth After Cutting.

able account. Such a company would find a very profitable field for the trifling capital it would be called upon to invest.'

A second issue of the same journal quoted from the New Zealand *Examiner* a comment upon the repeal of the paper duty and its important bearing on the interests of New Zealand. 'Some time ago, it said, 'when *The Times* (London) offered a reward for the discovery of a cheap substance for making paper, it was discovered by some enterprising individual that such a substance existed in New Zealand in great abundance, and might be obtained at a very small cost. It was, however, very bulky, so that the cheapest article became the dearest by the time it reached England. Through the ingenuity, however, of a colonist, New Zealand fibre was reduced to a pulp and pressed into bricks, available for paper-making, and the cost of transmission reduced to its minimum.

It was, however, decided by the Customs House officers that the pulp bricks were to all intents and purposes paper. What made the matter worse, they were foreign paper, which is subjected to a far heavier duty. Another obstacle still remained in the shape of the Excise officer, who, as soon as the bricks which had paid the duty were converted into paper, was ready to come down with a demand for another duty on the manufactured article. Readers will not, therefore, be surprised to learn that the New Zealand fibre, so well adapted as it is for the manufacture of the finest paper, has not yet been used. We trust, however, that by taking off the restrictions the enterprise will again be entered upon, and this time with triumphant success.'"

The world shortage of paper and the consequent high prices of same experienced during the great war period and since should have led to the extensive use of low grade Phormium in the manufacture of this product, apart from the utilization of old leaves such as those depicted in Plate 15.

As the Phormium is cut and gathered, the "stools" immediately commence the produce a new crop of leaves, and after two weeks a few inches of growth, more or less according to the soil conditions and the age and strength of the stools, may be observed. This growth continues, and at the end of three months the ground is again covered with green Phormium, as illustrated in Plate 16.

Where the soil of a flax-field is of good uniform fertility with an even distribution of sufficient capillary moisture, the plants, provided they be a good variety and thrifty, will make regular growth, but a field of Phormium where irregular and adverse conditions prevail will be patchy. Plate 17 shows a section of one of the Emerald flax-fields nine months after cutting; from a study of this it will be obvious that further explanation in this regard is unnecessary.

Yield and Prospects of the Industry.

Being as yet in its infancy, there is not sufficient data to hand on which to base calculations as to the general yield and commercial prospects of the Phormium flax industry in Victoria. It is known, however, that the Phormium thrives well in all parts of the State, and that the fibre produced at Emerald was of uniformly good quality, and realized the highest price obtainable for this product. These facts

considered, and also because of the continually increasing demand for ropes, binder-twine, and other cordage, it is probably safe to state that, if established sufficiently extensively and conducted on sound commercial lines, a prosperous future awaits this industry.

Most of the Phormium in New Zealand grows in swamps, and these, according to the officials of the New Zealand Department of Agriculture, often yield from 12 to 18 tons of green leaves per acre, and if thoroughly drained and cultivated, upwards of 50 tons per acre could be gathered. The experience of the New Zealand flax-millers is that it takes from 5½ to 6 tons of green leaves to make 1 ton of fibre.

The Phormium is usually gathered from private land, and the owners claim a royalty; in some cases 12s. per ton is paid for the leaves as they are carted to the mill. The cost of cutting and binding is from 10s. to 12s. per ton. In some parts, where the mills are worked in the vicinity of navigable streams, the pre-war cost of the green leaf delivered at the mills was about 25s. per ton.

The Hon. Geo. Swinburne, when Minister of Agriculture, visited New Zealand, and after giving attention to the hemp industry, gave one instance of a land proprietor receiving £9 per acre as royalty for the privilege of cutting leaves from his land.

In Gippsland there are many large areas of swampy country which, if drained and planted, would be eminently suitable for the cultivation of Phormium, and mills for the treatment of same could be erected and worked on either private or co-operative lines.

(To be continued.)

COMBATING DROUGHTS.

Following a resolution by Parliament last session, the Government of South Africa has decided to appoint a Commission to inquire into the best means of avoiding losses by drought. The scope of inquiry will be wide, the terms of reference being as follows:—

1. The methods by which losses to farmers owing to periodic droughts in the drier parts of the Union may be prevented, either by public or private action; and in particular whether any changes in farming methods are necessary for this purpose.
2. Any improvements in farming conditions generally such as the provision of more water, prevention of soil erosion, and any other matters which have a close bearing on point 1.
3. The methods by which indigency arising among the farming community in consequence of such losses could best be dealt with.
4. Thorough investigation into the different ways of producing feeding by the cultivation of various grasses, &c.

The Commission proposes to visit the drier parts of the Union which are subject to recurring droughts, and it is hoped that with the co-operation of the farming community, the Commission's inquiries will have beneficial results of the highest moment to farmers, and mark an epoch in the advancement of agricultural South Africa.

SMALL FRUIT CULTURE.

(Continued from page 679.)

By A. A. Hammond, Orchard Supervisor.

THE GOOSEBERRY.

The gooseberry has been cultivated in this State for many years chiefly as a side line; instead of production increasing commensurately with the growth of population there has been, until quite recent years, a gradual falling off. Commercial growers found the production of other fruits more profitable, consequently gooseberry plantations were uprooted or allowed to die out. The fact that this berry is comparatively free from disease, and therefore easily grown by amateurs, was also a factor inimical to commercial gooseberry culture.

The practice of commercial growers marketing the fruit green has not tended towards popularizing it, but has rather prevented its better qualities from becoming known. Its extreme sourness when green is objectionable to most people, consequently other berries which ripen at about the same time are more in demand.

Of recent years, however, the growing of gooseberries has become more profitable, and there has been a considerable increase in the demand for the berries at remunerative prices. Many former gooseberry growers, who had uprooted their plantations or let them die out have replanted, and several new plantations have been established. In a berry plantation recently established in the Gembrook district 30 out of the 40 acres are planted with gooseberries.

Only varieties of the European species (*Ribes grossularia*) are commercially grown in this State. A species (*Ribes oxyacanthoides*) indigenous to America is the commercial gooseberry of that country. The European species which were first cultivated there were ousted by the native American species, not because of the inferiority of the former, but because of its susceptibility to mildew. Here there is no trouble with fungoid pests as far as the gooseberry is concerned, and as long as this obtains there will be no need to introduce the American species, which is evidently inferior to the European.

Climate.

The gooseberry has a wider range of successful cultivation than most berry fruits. There is such a wide choice in varieties that a selection can be made to suit varying conditions of soil and climate. The commercial varieties, however, which do well in this State are few, and when grown commercially, plantations should be established only where the soil and climate are congenial. As with all the bramble family the gooseberry thrives best and is most productive when grown in moist, cool districts.

Locality and Soil.

In the cultivation of the gooseberry contiguity of markets is not so important as with the berries previously discussed. As they are marketed in a green state they can be conveyed long distances without deterioration. As far as gooseberry culture is concerned, nearness to markets should be sacrificed to congenial climate and soil. The difference in the price of land is also an important consideration.

Although the gooseberry is hardy, and not easily injured either by frost or sun, it is well to avoid hollows where the air drainage is bad, and aspects which expose the plantation to the full glare of the afternoon sun.

When planting different varieties those which are susceptible to sun scald, such as the Roaring Lion, should be placed in a cool position. Hardier sorts—Crown Bob, for example—can occupy warmer positions.

The gooseberry thrives on a great variety of soils, and is not so particular in this regard as most of the berries. The most congenial soil is a clay loam, which is retentive of capillary water. It will not thrive nor be productive on a cold, badly-drained clay. A deep, well-worked subsoiled clay-loam, naturally or artificially underdrained, is the ideal.

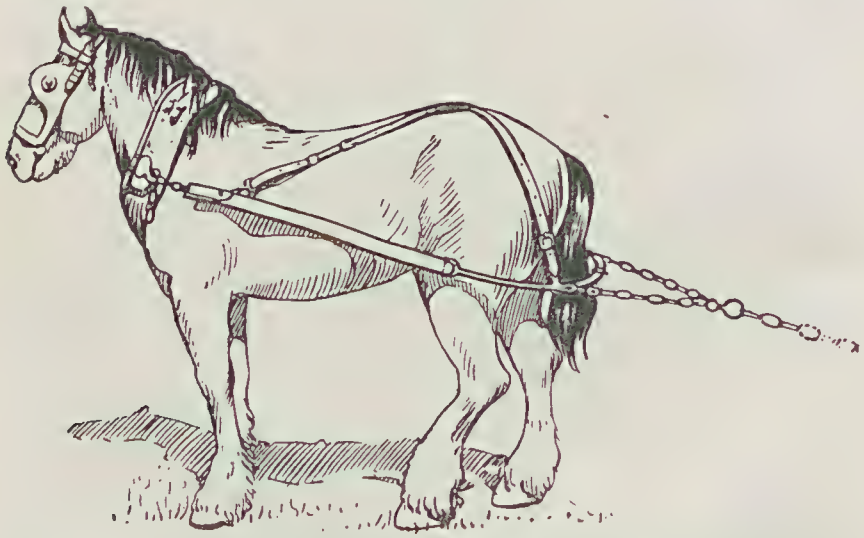


Fig. 16.—Harness Designed for use when Cultivating between Young Trees, &c.

Cultivation, Manuring, Irrigation.

What has been written regarding the cultivation, manuring, and irrigation of the loganberry applies to the gooseberry. Soils that are not naturally rich in humus should receive liberal dressings of organic manure; stable manure is the best of these; well rotted cow manure is highly spoken of by some growers. A dressing of potash should be applied in early spring as supplementary to cow manure. Unleached wood ashes, as is generally well known, is a valuable potassic fertilizer, and may be used if available instead of the commercial potash.

Irrigation is essential in the dry, warm districts. It is rarely necessary in the congenial moist hilly districts. At Doncaster it has been found necessary to apply water once or twice according to the season. Here also, owing to the retentive nature of the soil, tile drains have had to be laid.

Cultivation should be practised as recommended for other berries, and as hand labour is costly, the plants should be set sufficiently wide apart to permit of cultivation with plough and spring tooth cultivator. Deep cultivation is not usually practicable without injury to the roots

of plants, as the gooseberry is rather shallow-rooted in most soils. Not much injury will be done if the soil is regularly worked to the same depth every year after planting.

Frequent and shallow cultivation during the summer is required. It may be mentioned here that considerable damage is often done to plants by the swingle-tree in common use. The orchard harness as shown in Fig. 16 is designed to obviate this, and its use, particularly in small fruit plantations, is specially recommended.

Propagation.

The usual method of propagating the gooseberry is by cuttings. Those varieties which are hard to strike are often propagated by layering. All our commercial varieties, with the exception of Crown Bob, root readily from cuttings. Even with this variety layering is seldom resorted to. The general opinion is that better plants are obtained from cuttings.

When layers are required the plant is cut hard back in winter to induce strong growth. About mid-summer the earth is mounded up around the growing shoots to within a few inches of the tips. The stronger shoots should be ready for planting out the following winter. Weakly shoots should be left a year longer.

In selecting cuttings it is important to secure straight, well-ripened wood of the previous season's growth. Good plants cannot be raised from weak spindling growths. The cuttings should be at least 12 inches long, preferably 15 inches. To obtain these it is necessary to cut the parent plants hard the preceding winter. The cuttings may be taken as soon as the leaves fall in early winter, and planted out in position or in a nursery, or this work may be deferred till early spring. In well-drained warm land, cuttings may be planted at any time during winter.

In this state the gooseberry is grown in what is known as the tree form. To obtain this form it is necessary to cut out all buds except three or four of the uppermost, which are left to form the main arms of the plant.

When grown in the bush form, as practised in the United States of America, no buds are removed from the cutting, with the result that suckers are thrown up annually. These are kept for renewal purposes. It is owing to the ravages of the cane borer that the bush form is favoured in America.

When grown on one stem the plant is completely ruined if attacked by this insect. On the other hand, the annual production of new stems and the cutting out of the old enables the grower to combat this pest. We have no pest in Victoria which renders necessary the adoption of the bush form, and experience has proved the tree form to be the better as far as the management and the productiveness of the plant is concerned. Cuttings should be planted about 6 inches to 7 inches deep in soil which has been reduced to a fine tilth and deeply worked. When set out in a nursery they should be planted about 10 inches apart in rows 18 to 24 inches apart, and the soil well firmed around them.

Planting.

The necessity of thoroughly preparing the land for planting has already been emphasized. It should be deeply worked, and, if necessary,

underdrained. Deep cultivation increases root pasturage and the capacity of soil to retain its capillary water. The gooseberry and currant are naturally shallow-rooting plants. By breaking up the soil deeply, and underdraining when required, the roots are induced to feed at a greater depth, thereby rendering the plant more resistant to drought and allowing of deeper tillage.

On flat land having a heavy retentive clay subsoil there is no advantage in subsoiling unless accompanied by underdrainage. In fact, badly drained land is injured and the evil of stagnant water aggravated by trenching or subsoiling.

The distance apart at which to plant depends on whether it is intended to hand work or cultivate with a horse. The nature of the soil must also be considered. In rich soils some varieties grow into immense bushes, and take up a lot of space, consequently they require to

Fig. 17.—A Well-shaped Gooseberry Bush of the Roaring Lion Variety.

be planted farther apart than when grown on poorer land. The distance between plants recommended for commercial plantations is 7 feet apart in rows 8 feet apart. This permits of cross cultivation with horse cultivators. The rows should run as far as practicable with the fall of the land. The ploughing being done in this direction allows of better drainage in the winter. In large plantations it is necessary to leave a track for a vehicle about 10 feet wide at convenient intervals. This is required when manuring the land and when harvesting the berries. The planting may be done by opening out a furrow, as recommended for planting the brambles, or with a spade and line. Whatever method is adopted, care should be taken to line the plants in every direction. A plantation properly laid out not only looks much better, but the work of cultivation is much easier.

Pruning.

Little care is usually given to the pruning of the gooseberry. A few specialists recognise the value of correct pruning methods, and

treat their plants accordingly. To obtain regular crops of good quality berries judicious annual pruning is a necessity. The harvesting of the berries, too, is intimately associated with the pruning, as with most varieties it is an almost impossible task to gather the fruit from the tangled mass of thorny growths of a neglected bush. The berries on a well-pruned bush are larger, mature more evenly, and are of a uni-

Fig. 18.—A Neglected Roaring Lion Gooseberry Bush before Pruning.

Fig. 19.—The Same Bush, as shown above, after Pruning.
(It has been cut very hard to induce an upright growth.)

form size. As the bushes are picked clean at the one operation an even sample in respect to size and maturity is of considerable advantage.

The type of bush as shown in Fig. 17 should be the aim of the pruner. The bush should have a clean stem of from 4 to 6 inches, with leaders inclined at an angle of from 30 to 45 deg. The stronger the leaders the more upright will be their growth; therefore, the

number of branches left to a bush depends on its vigour. Fewer leaders should be left on a weakly bush, and they should be cut hard to strengthen them.

The leaders of varieties such as the Roaring Lion should be cut to a top bud, where they begin to droop. Fig. 18, which is a specimen of a badly pruned neglected bush of the Roaring Lion variety, shows

Fig. 20.—Roaring Lion. The Leading Commercial Variety and Best All-round Gooseberry.

(Note.—The gooseberry sprays shown in Figs. 20, 21, 22 and 23 and the currant sprays in Figs. 28 and 29 were all photographed from the same distance.)

the leaders drooping to the ground. Fig. 19 shows the same bush after pruning. It has been severely cut back to induce new and upright growths. If properly pruned in the beginning such drastic treatment would have been unnecessary. In Fig. 19 it will be noticed that all weak laterals have been shortened back to one or two buds, that is, to about an inch long. This is the method advocated. The fruit is borne on natural spurs on the leaders and on short artificial spurs.

When this method of pruning is adopted the bush has an open centre; there is ample room between the fruit-bearing shoots, and the berries can be easily gathered.

It is said that gooseberries bear their best fruit on the wood of the previous season's growth. This is true only when the natural spurs on the leaders are starved by allowing too many laterals to persist.

Fig. 21.—A Good Dessert Variety, but bush very Thorny.

There is no objection to keeping a number of one-year-old laterals for fruiting even if some are growing towards the centre of the bush, provided they are not crowded and thus prevent the easy harvesting of berries, but these should not be kept at the expense of the natural spurs.

It is claimed by some growers in the warmer districts that the centres of bushes should not be kept too open, as this method of pruning results in the scalding of the berries. Scalding, however, is most likely to occur on debilitated bushes, sparsely foliaged, and when the fruit is borne on branches almost horizontal, where it is exposed to the direct rays of the sun.

To summarize, the gooseberry should be trained to form a head of from six to ten main leaders, according to the vigour of the plant. Sub-leaders and laterals may be retained when the retention of such does not exhaust the plant nor interfere with the harvesting of the fruit. Laterals generally should be cut back to short stubs containing one or two buds, and the leaders shortened back sufficiently to keep them sturdy.

Harvesting and Marketing.

As previously mentioned, gooseberries are usually picked when quite green. In this state they are used for bottling, jam, jelly, and cooking. The best berries are used for bottling, and command the highest price. Some growers specialize in the production of berries for this purpose, adopting the pruning methods advocated above.

Fig. 22.—Ostrich, a new Variety. Large Berry of good quality and one coming into favour.

The harvesting of gooseberries begins about the fourth week in November. Most varieties are not ripe till Christmas. Berries are picked into all kinds of vessels, the one generally used being the ubiquitous kerosene tin. Some growers use wooden buckets. They state that the berries are injured when picked into tins that are necessarily left standing in the sun.

The price paid to pickers varies from 4d. to 5d. per dozen pounds. When pruned on the rod system the berries are sometimes stripped off the branches, the operator wearing leather gloves to protect the hands. A considerable quantity of leaves is pulled with the fruit in stripping, and this necessitates winnowing afterwards. Stripping is not generally practised nor allowed by growers, as unless carefully done there is danger of injuring the buds; nor can ripe fruit be gathered in this way as the berries would not stand the rough handling.

Varieties.

The Roaring Lion is the leading commercial variety, and is grown almost exclusively in some districts. It is a fine large, red berry when

ripe, and is preferred for bottling on account of its size and smooth skin. It is a heavy cropper, does well in most districts, and is not so prickly as most varieties.

Crown Bob is another red variety which is largely grown, and does well in most districts. It is a fine large berry, good either for cooking or dessert; it is not so susceptible to sun scald as the Roaring Lion, and comes in just after it.

Other red varieties which are favoured by growers are Warrington, Overall, and Billy Dean. Of the white, green, and yellow varieties Ostrich comes first in favour. Heart of Oak is a good green, and Rockwood a good yellow variety.

Duration of Plantation and Yield.

The questions are often asked, "How long will a gooseberry plantation last, and what is the yield per acre?" These are difficult questions to answer. Plantations have been known which at the end of

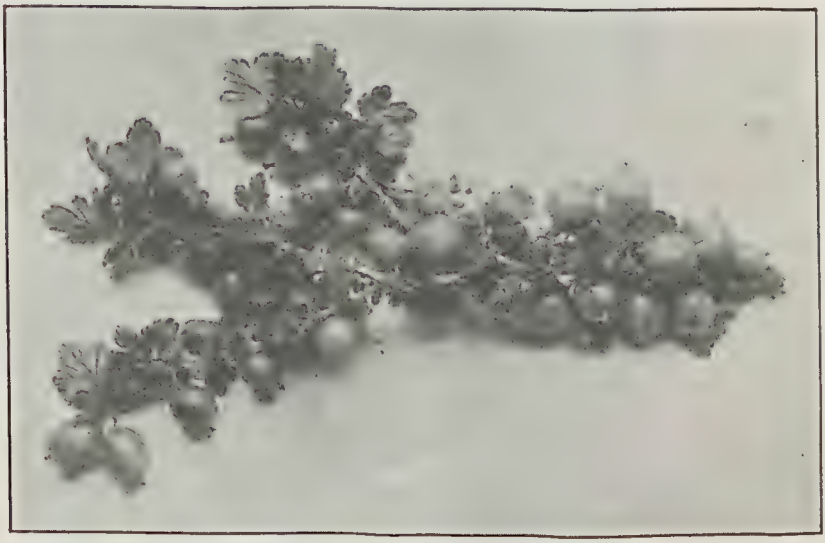


Fig. 23.—Rokewood—A Good Yellow Variety.

twenty years were still yielding good crops. This is exceptional. The average profitable life of the gooseberry may be given as ten to twelve years. Soil, climate, disease, and cultural treatment are all factors affecting the life of the plant. With respect to the yield, this also varies considerably for the reasons given above. Single bushes have been known to yield 35 lbs. of berries. If all plants bore equally well this would give a yield from a plantation planted 7 feet x 8 feet apart of over 12 tons to the acre. This is three to four times the average., which may be set down as from 3 to 4 tons per acre for full-grown bushes properly cared for.

CURRANTS.

Currants are less extensively cultivated than any of the small fruits previously discussed, and there has been a gradual falling off in production for the past ten years.

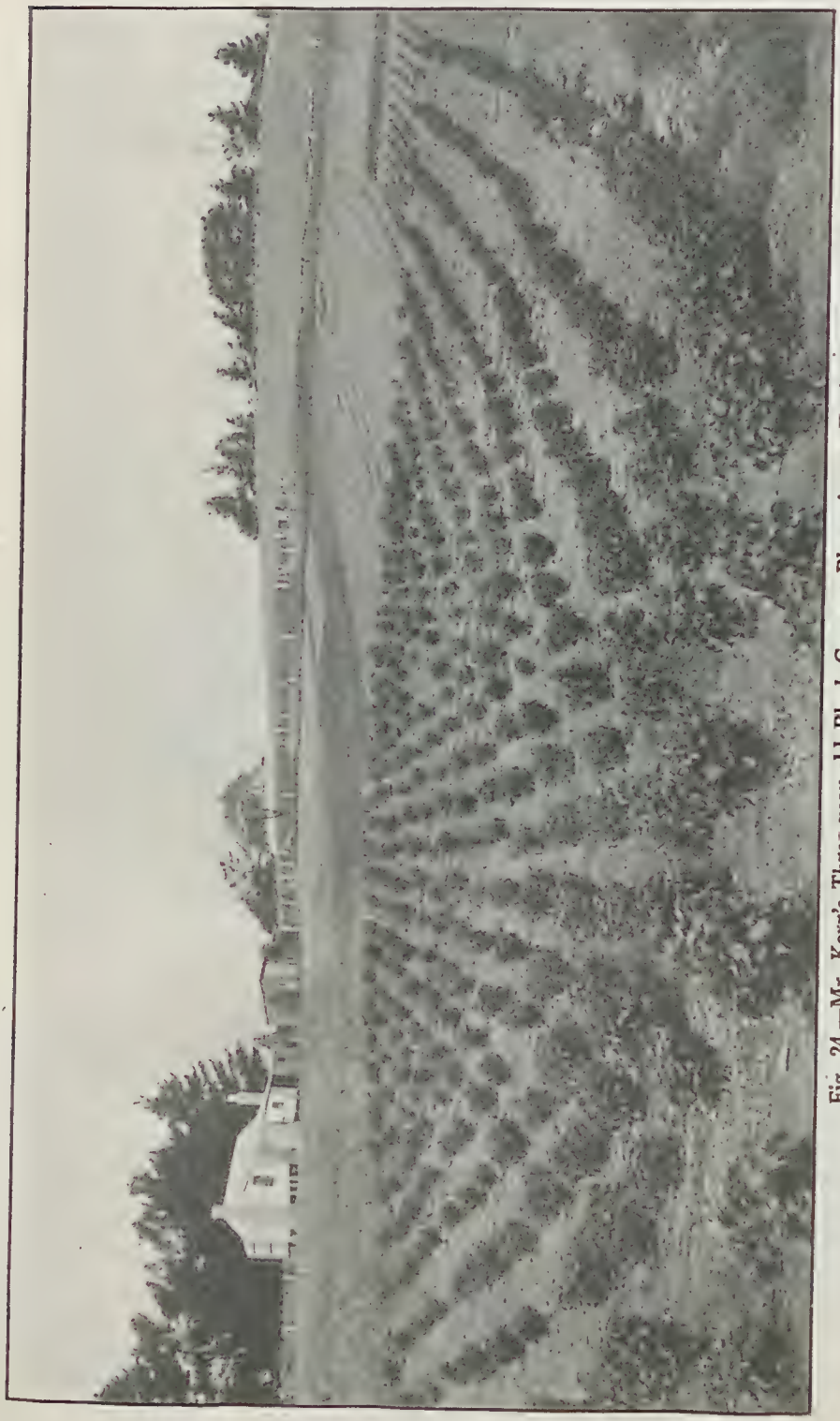


Fig. 24.—Mr. Kerr's Three-year-old Black Currant Plantation at Buninyong.
(The varieties grown there are Boskoop Giant, Dunnett's, Black Naples, and Carter's Black Champion.)

According to the *Victorian Year-Book*, the product of Victorian plantations of red, white, and black currants for the year 1910 was 1,428 cwt. In 1919 only 305 cwt. was produced, despite the fact that for jam and jelly no berry is more highly appreciated.

Black currants are largely grown in Tasmania, where they do particularly well, and practically the whole of the requirements of Victorian jam manufacturers are imported from that State. The demand in Victoria seems to be confined chiefly to housewives for supplies for home-made jam and jelly.

There would appear to be room for a profitable expansion in currant culture, for, as with the gooseberry, there has in the last year or two been a ready sale of this berry at payable prices.

In view of the improved outlook more attention has recently been given to the production of this berry, and many new plantations have been established.

Soil and Locality.

The red currant can be grown almost anywhere in the cooler districts of the State, but its natural habitat is the cool, moist hilly districts, and it is there only that it can be profitably raised. The red and white currants, which are very nearly related, have a much wider range than the black. The white currant is seldom cultivated, and being exactly like the red as regards its requirements of soil, climate, &c., it need not be further considered.

The black currant, on the other hand, is very fastidious in respect to soil and climate. It will thrive only in the coldest parts of the State. The soil also must be rich and of the right character. Several attempts have been made to grow this fruit in the Wandin district, but without success. The plant makes a fair growth, but will not fruit. Some varieties bear a little fruit, but not sufficient to make the plants worth cultivating.

The districts which, up to the present, have proved most suitable for this berry are those situated to the north-west of the metropolis, and include Ballarat, Malmsbury, Woodend, and Trentham. The elevation above sea level of these places ranges from 1,416 to 2,264 feet, and experience goes to prove that the black currant can be successfully grown in Victoria, only in the cold, elevated, mountainous districts.

The soil best suited for the black currant is a rather heavy clay loam, rich in humus. It does well in the rather heavy black volcanic soil which is found in patches at Buninyong, and soil of this character there is always reserved for it. The red currant thrives on a lighter soil and at a considerably lower elevation.

In choosing a site for a black currant plantation one that slopes to the south-east is to be preferred. Protection from the hot north winds should be aimed at. Like the raspberry, the black currant delights in a cool, moist situation, and the advice given respecting the former in regard to site and shelter is applicable to the latter.

Propagation.

Currants strike readily from cuttings. Well ripened shoots of the previous season's growth, such as are shown in Fig. 25, should be secured. In all respects the propagation of the currants is the same as the propagation of gooseberries.

Some growers do not cut out the buds on the lower part of the cuttings as advised for gooseberries, and grow the plants on what is called the bush system. The red currant is frequently grown this way. The objection to allowing the currant to sucker is not so great as with the gooseberry, as the difficulty in harvesting is not a consideration. However, the removal of all buds from the cutting except

Fig. 25.—Black Currant Cuttings.

1.—Boskoop Giant.
2.—Black Naples.
3.—Black Prince.
4.—Dunnett's Champion.
5.—Lee's Prolific.
6.—Carter's Black Champion.

The stronger of these are the most desirable for planting.

the three or four uppermost is usually practised, and is the method recommended. When good wood is required for cuttings the plants from which they are to be taken should be cut hard during the previous winter. Good strong wood can be obtained from plants grown on the bush system, and some growers keep a few bushes for this purpose.

In England the red currant is worked on the flowering currant (*Ribes aureum*), which makes a stronger bush.

Fig. 26.—Carter's Black Champion—Grown on the Tree System—Before Pruning.

Fig. 27.—The Tree shown above after Pruning.

Pruning.

The pruning of the red currant is similar to that of the gooseberry. Having no thorns to contend with in harvesting, the opening out of the centre of the bush is unnecessary. Fruit is borne on wood of the

previous season's growth and on spurs of older growth. The black currant does not spur so freely, and a succession of healthy young wood must be maintained.

Figs. 26 and 27 show Carter's Black Champion, grown in tree form, before and after pruning. The leaders have been thinned out and weak laterals spurred back.

Fig. 28.—Dunnett's.—Heavy Cropper, Berries Rather Small.
(Note.—The gooseberry sprays shown in Figs. 20, 21, 22 and 23 and the currant sprays in Figs. 28 and 29 were all photographed from the same distance.)

Planting.

Planting may be done at any time after the leaves fall till early spring. The distance apart to plant is the same as that advised for the gooseberry. Bushes do very well planted 8 feet x 4 feet, but when this is done cultivation can be carried out only one way, and a good deal of hand labour is necessary.

With respect to cultivation, irrigation, and manuring, the advice given in connexion with other berries applies to currants. It must be remembered that although the currant rejoices in a deep moist rather heavy clay loam, it will not thrive on a badly-drained water-logged soil.

Gathering and Marketing.

When picking, berries should not be torn from the stems. If this be done they soon spoil. It is also important not to gather them when wet. If intended for shipment to distant markets they should be picked on the firm side. When sold in contiguous markets they can be left to stand till quite ripe, as they carry well. Ripe berries should be marketed in punnets like the raspberries and loganberries. When harvested firm and intended for factory use the half-bushel case is used.

Varieties.

There is considerable confusion in the nomenclature of currants in this State. Distinct varieties are grown under one name and the same

Fig. 29.—Boskoop Giant. A very large Berry, and promises well in the Ballarat District. Ripens Early.

variety is known under different names in different localities. Varieties that run very close are often mixed up indiscriminately in a plantation. This confusion in naming is evidently not confined to Victoria. In England, where the black currant has been largely grown for centuries, the same confusion exists. Mr. R. G. Hatton, in the *Journal of Pomology,* in discussing this subject, states—"Fortunately, early in our observations we discovered that growers were hopelessly at variance with regard to nomenclature, and that in discussing together the merits of different varieties they were frequently drawing conclusions in no way comparable. In some cases two, or even three distinct varieties were received under a single name from an individual

grower, whilst the 'Boskoop Giant' of one, was the 'Victoria' of another, and the 'French' of a third. Or, again, the same variety would be sent under the various names of Baldwin, Black Naples, Carter's Black Champion, or Lee's Prolific."

As is generally well known, varieties that do well in one district are a failure in others, and *vice versâ*. For this reason, if for no other, it

Fig. 30.—A Red Currant—Fay's Prolific—Three Years Old.
(Photographed in Mr. Kerr's Plantation at Buninyong.)

is important that varieties should be true to name. Great care, then, is necessary for intending planters to secure varieties which are known to thrive in the district where they intend to plant.

Dunnett's, Carter's Black Champion, Black Naples, and Boskoop Giant are the leading varieties of black currants grown. Of these, Dunnett's is the smallest berry and Boskoop Giant the largest. Of the red currants, La Versailles and Fay's Prolific are the leading varieties.

STANDARD TEST COWS.

REPORT FOR QUARTER ENDED 30th SEPTEMBER, 1920.

The cows which completed the test number 221 of which 174 qualify for certificates. Individual returns are as follow:—

W. K. ATKINSON, Swan Hill. (Shorthorn.)

Completed since last report, 4. Certificated, 4.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Pearl of Willow Park ..	Not yet allotted	28.9.19	273	24½	9,047	3·63	328·12	175	374
Blanche Rose 10th ..	,,	21.10.19	273	24	11,771	3·51	422·93	250	482¼
Duchess of Willow Park ..	,,	5.11.19	273	23½	8,510	3·77	320·59	175	365¾
Cherry 5th	,,	18.11.19	273	11½	6,927	3·89	269·45	250	307¼

J. BAKER, Gheringhap. (Red Poll.)

Completed since last report, 3. Certificated, 3.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Elcho Beauty	Not yet allotted	27.9.19	225	4	6,794	4·36	306·34	250	349¼
Karong Rose 3rd	,,	2.10.19	273	8½	5,497	4·10	225·26	175	256¾
Karong Lily	,,	6.10.19	273	8	4,661	5·01	233·55	175	266¼

C. BAMFORD, Benalla. (Ayrshire.)

Completed since last report, 1. Certificated, 1.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Pansie of Medburn Grove ..	4860	9.10.19	273	7½	7,178	4·45	319·26	175	364

F. BIDGOOD, Staghorn. (Jersey.)

Completed since last report, 1. Certificated, 1.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Butter Queen of Staghorn ..	5591	16.9.19	273	5	3,262	5·90	192·59	175	219½

W. A. FRANCIS, Kilcunda. (Ayrshire.)

Completed since last report, 1. Certificated, 1.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Elena of Springfield ..	4967	29.9.19	273	14	5,123	4·53	231·94	175	264½

G. GANGE, Jun. (Ayrshire.)

Completed since last report, 1. Certificated, Nil.

GEELONG HARBOR TRUST, Marshalltown. (Ayrshire.)

Completed since last report, 7. Certificated, 7.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Beatrice of Sparrovale ..	3882	30.10.19	261	4	6,811	3·71	253·05	200	288½
Meadow Sweet of Sparrovale	3903	31.10.19	273	9½	7,038	4·49	316·37	200	360⅜
Melba of Sparrovale ..	3904	3.12.19	273	15½	5,733	4·61	264·25	175	301½
Daisy of Sparrovale ..	3888	18.12.19	273	16½	6,421	4·93	316·71	200	361
Floss of Sparrovale ..	3892	19.12.19	273	20	5,570	4·24	236·71	175	269½
Flora of Sparrovale ..	3891	23.12.19	273	7½	6,011	5·11	307·23	250	350½
Rose of Sparrovale ..	3906	24.12.19	273	26	9,181	4·71	432·88	250	493⅛

H. S. GIBSON, Tyntynder South. (Ayrshire.)

Completed since last report, 1. Certificated, 1.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Gentle of Evergreen ..	6361	3.11.19	*238	13	7,183	4·35	312·34	250	356

* Withdrawn before completion of term.

W. C. GREAVES, Monomeith. (Ayrshire.)

Completed since last report, 6. Certificated, 6.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Lelia of Warrook	5173	1.10.19	273	8¼	6,656	5·01	333·69	200	380½
Fairy of Warrook	5170	3.10.19	273	14	6,701	4·76	319·28	200	364
Fashion of Warrook ..	5171	3.10.19	273	14	5 947	5·36	318·59	200	363¼
Fuchsia of Warrook ..	2544	6.10.19	273	23	9,544	4·39	418·63	250	477¼
Verona of Warrook ..	5174	9.10.19	273	17	7,843	4·22	330·90	250	377¼
Verbena of Warrook ..	Not yet allotted	27.11.19	273	23¼	7,099	4·44	315·04	175	359¼

T. HARVEY, Boisdale. (Jersey.)

Completed since last report, 1. Certificated, 1.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Daisy 5th of Holmwood ..	4978	17.10.19	273	7½	6,065	4·59	278·21	250	317¼

W. HENDERSON, Grasmere. (Ayrshire.)

Completed since last report, 12. Certificated, Nil.

J. H. HUNTER, Tyntynder South. (Jersey.)

Completed since last report, 2. Certificated, 2.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Peerless 13th of Melrose ..	Not yet allotted	28.9.19	273	15	8,744	5·35	467·91	200	533½
Tiny of Tarnpirr	5172	25.12.19	273	15	5,788	6·16	357·01	250	407

S. A. JOHNSON, Woodend. (Ayrshire.)

Completed since last report, 5. Certificated, 5.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Bountiful of Roxburgh ..	Not yet allotted	28.9.19	259	4	5,265	4·82	253·81	250	289¼
Brown Bess of La Motte ..	5254	11.10.19	273	12½	5,218	4·72	246·72	175	281¾
Bountiful of La Motte ..	5253	25.11.19	273	10½	7,649	4·34	332·33	250	378¼
Joan of La Motte	5257	2.12.19	249	4	6,597	4·00	264·23	250	301½
Jessamine of La Motte ..	5256	14.12.19	273	21	5,675	4·49	255·07	175	290¼

A. W. JONES, Whittington, Geelong. (Friesian and Jersey.)

Completed since last report, 7. Certificated, 7.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Friesian.—Completed since last report, 4. Certificated, 4.									
Bolobek Rose*	Not yet allotted	19.4.19	†244	29½	10,048	4·21	423·07	200	482¼
Princess Royal	,,	25.10.19	273	13½	11,422	3·60	410·82	250	468½
St. Alban's Lady	,,	30.11.19	273	23	6,725	4·15	279·45	175	318½
St. Alban's Gem	,,	13.12.19	273	33½	9,138	3·42	312·17	175	355¾
Jersey.—Completed since last report, 3. Certificated, 3.									
Lady Grey 8th of St. Albans	4187	6.11.19	273	21½	8,362	4·85	405·50	250	462½
Lady Grey 9th of St. Albans	Not yet allotted	11.12.19	273	12½	4,329	5·96	258·23	175	294½
Lady Grey 10th of St. Albans	,,	26.11.19	†254	10	3,789	5·40	204·45	175	233

* Inadvertently omitted from previous report. † Withdrawn before term completed.

G. KENT, Junr., Archie's Creek. (Ayrshire.)

Completed since last report, 1. Certificated, Nil.

J. KERR, Bacchus Marsh. (Shorthorn.)

Completed since last report, 5. Certificated, 5.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Morven Duchess 13th ..	Not yet allotted	26.9.19	273	7	7,478	4·08	305·51	200	348¼
Morven Queenie 10th ..	,,	28.9.19	273	6½	6,859	4·03	276·48	200	315¼
Morven Duchess 15th ..	,,	8.10.19	273	7½	7,706	3·70	285·11	200	325
Morven Daisy 4th	,,	22.10.19	273	5	5,402	4·07	220·86	200	251¾
Morven Cressida 2nd ..	,,	4.11.19	273	9½	6,000	3·94	236·19	200	269¼

J. A. LANG, Alvie. (Ayrshire.)

Completed since last report, 10. Certificated, 7.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Crest of Willowvale ..	5316	30.9.19	273	13	6,200	4·13	256·12	175	292
Gem of Roxburgh ..	5120	4.10.19	273	20	7,058	3·99	281·60	200	321
Goodness of Roxburgh ..	3822	17.10.19	273	19	7,154	4·15	296·99	200	338½
Emily of Riccarton ..	6493	30.10.19	273	22½	6,024	4·18	251·99	175	287¼
Bud of Roxburgh	5119	26.11.19	273	12	4,977	4·54	225·99	175	257¾
Wave of Willowvale ..	5320	7.12.19	273	10	4,675	5·19	242.47	175	276½
Berylan of Riccarton ..	6493	25.12.19	273	12	6,711	4·38	294·28	200	335¾

Mrs. E. M. LENNIE, Tongala. (Jersey.)

Completed since last report, 3. Certificated, 2.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Stumpy 4th of Holmwood ..	Not yet allotted	9.10.19	273	17½	6,746	5·11	344·54	200	392¼
Pearl of Hillcrest	6013	19.11.19	273	25½	8,745	4·82	422·32	250	481½

AGRICULTURAL HIGH SCHOOL, Leongatha. (Jersey.)

Completed since last report, 2. Certificated, 2.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Mona's Pride of Woorayl ..	Not yet allotted	28·9·19	273	11	5,515	6.93	381·97	200	435¼
Mona of Hillcrest	5926	27.10.19	240	4	7,550	4·56	344·06	250	392¼

LESLIE and GERRAND, Sale. (Ayrshire.)

Completed since last report, 2. Certificated 2.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Peaceful of Raith	5324	14.10.19	273	11½	6,983	4·30	300·19	200	342½
Peggy 3rd of Summerhill ..	5325	22.11.19	*265	10	6,266	4·26	266·75	200	304

* Withdrawn before completion of term.

H. LIDGETT, Myrniong. (Shorthorn.)

Completed since last report, 1. Certificated, 1.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Duchess of Pentland 30th ..	Not yet allotted	7.10.19	273	4	4,880	4·16	203·36	200	231¾

C. D. LLOYD, Caulfield. (Jersey.)

Completed since last report, 4. Certificated, 4.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
White Stockings	6062	3.10.19	273	14¼	7,872	5·05	397·90	250	453¼
Sweetbread 24th	2979	7.10.19	273	21¼	9,617	5·09	489·56	250	558¾
Creambread	4239	17.10.19	273	15	6,694	5·86	392·04	250	447
Gingerbread	5197	5.11.19	273	9¼	5,864	5·46	320·28	250	365

Mrs. H. LUXTON, Kew. (Jersey.)

Completed since last report, 1. Certificated, 1.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Lotinas Lady	4286	2.11.19	273	16	6,522	4·57	298·24	250	340

C. G. LYON and R. R. KERR, Heidelberg. (Jersey.)

Completed since last report, 12. Certificated, 12.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Mary Anne of Banyule ..	6072	9.10.19	273	20½	8,015	5·51	441·34	200	503
Melodious	2336	20.9.19	273	14	6,660	5·46	363·85	250	414½
Coralloid	6065	27.10.19	247	4	3,625	5·61	203·32	175	231½
Audrey Lassie	825	11.11.19	273	22	8,969	4·24	380·01	250	433¼
Lily 4th	Not yet allotted	15.11.19	273	18	7,055	5·57	393·02	200	448
Mabel's Petal of Banyule ..	,,	19.11.19	273	18	5,611	5·62	315·30	175	359¼
Colleen Rhue of Banyule ..	,,	23.11.19	273	12	4,470	5·97	267·06	175	304¼
Silvermine 20th of Banyule..	,,	26.11.19	273	19	6,374	5·81	370·53	175	422½
Tiddlewinks III.	,,	27.11.19	273	19½	5,835	5·92	345·43	200	393½
Lady Monda	,,	5.12.19	273	18¾	5,586	5·36	299·52	175	341¾
Dido II. of Banyule ..	,,	20.12.19	273	14	6,000	5·46	327·87	175	373½
Magnet's Lass 5th of Banyule	,,	24.12.19	273	14½	4,427	6·54	289·69	175	330¼

L. McFARLANE, Bundoora. (Ayrshire.)

Completed since last report, 6. Certificated, 6.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Beryl of Gleneira	2441	26.9.19	255	4	8,796	4·08	359·14	250	409¼
Daphne of Ayrbrae ..	5403	27.9.19	273	5½	5,879	4·88	286·92	200	327
Mulberry II. of Gleneira ..	3443	2·10.19	273	17½	8,511	3·82	324·82	250	370¼
Little Virtue of Ellerslie ..	6649	29.10.19	273	15½	5,413	5·18	280·45	175	319¾
Maiden of Ayrbrae ..	5404	6.11.19	263	4	6,300	4·15	261·64	200	298¼
Sylvia of Ayrbrae ..	5409	16.11.19	273	9	5,062	4·55	230·32	175	262½

W. J. McKERNAN, Tatura. (Ayrshire.)

Completed since last report, 1. Certificated, 1.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Jessie of Willowvale ..	4647	15.10.19	273	4	5,360	4·74	254·06	200	289¼

P. J. MALONEY, Tongala. (Jersey.)

Completed since last report, 3. Certificated, 3.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Marie of Bonshaw ..	Not yet allotted	16.12.19	273	12	5,252	4·59	241·35	175	275¼
Beauty of Bonshaw ..	,,	17.12.19	273	10	4,470	5·42	242·53	175	276¼
Our Choice of Tarnpirr ..	6034	23.12.19	273	21	7,085	6·09	431·20	200	491¼

MEIER BROS., Box Hill. (Jersey.)

Completed since last report, 1. Certificated, 1.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Flower Queen	4285	8.11.19	*201	24	5,308	5·21	276·82	250	315½

* Sold before completion of test.

T. MESLEY, Dalyston. (Jersey.)

Completed since last report, 3. Certificated, 3.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Brighton Peeress 2nd ..	Not yet allotted	10.10.19	273	10	3,392	6·25	211·91	175	241½
Tilly Lantry 2nd of Warrenda	,,	25.11.19	273	12	4,717	6·24	294·60	175	335¾
Music of Warrenda ..	,,	19.12.19	273	16½	4,571	5·59	255·79	175	291½

J. R. MITCHELL, Sandford. (Red Poll.)

Completed since last report, 1. Certificated, Nil.

MUHLEBACH BROS., Batesford. (Ayrshire.)

Completed since last report, 6. Certificated, 6.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Daisy Bell of Retreat ..	4326	30.9.19	273	13½	5,782	4·51	260·70	175	297¼
Pansy of Retreat	4336	30.9.19	249	4	5,806	5·14	298·69	250	340¾
Daffodil of Retreat ..	5383	6.10.19	273	6½	6,452	4·24	273·40	200	311¾
Verbena of Retreat ..	4341	7.10.19	273	5¾	4,109	4·32	177·73	175	202¾
Pretty of Retreat	4338	17.10.19	268	4	5,306	4·92	261·19	175	297¾
Modesty of Retreat ..	4335	25.10.19	257	4	4,981	4·60	229·20	200	261¼

Mrs. LILIAN ORCHARD, Grahamvale. (Jersey.)

Completed since last report, 4. Certificated, 3.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Daffodil of Jersey Vale ..	Not yet allotted	3.10.19	273	13	4,771	5·25	250·63	200	285¾
May of Jersey Vale ..	,,	18.10.19	273	9	4,670	5·62	262·58	175	299¼
Myrtle 2nd of Jersey Vale ..	,,	27.11.19	273	13½	3,190	5·96	190·13	175	216¾

R. RALSTON, Moglonemby. (Ayrshire.)

Completed since last report, 3. Certificated 3.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Lady Duchess of Ben Kell ..	4578	26.9.19	222	4	5,596	3·85	2 5·66	200	245¾
Welcome of Ben Kell ..	4591	12.10.19	273	10	6,660	3·73	248·51	175	283½
Treasure of Ben Kell ..	4589	13.10.19	248	4	6,720	3·96	266·04	250	303¾

Miss BRUCE REID, Bundoora. (Jersey.)

Completed since last report, 7. Certificated, 7.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Cartoon 5th	317 C.S.J.H. B.	14.11.19	263	4	5,593	5·40	301·87	250	344¼
Jubilee Daffodil	Not yet allotted	20.11.19	273	14	6,212	4·86	301·66	200	343¾
Noble's Coquette	,,	29.11.19	273	11	4,625	5·43	251·54	200	286¾
Jubilee Wynda Wild Flower	,,	30.11.19	273	17	4,887	5·95	290·92	200	331¾
Willoh's Dagmar	551 C.S.J.H. B.	4.12.19	273	4½	5,059	5·28	267·13	250	304¼
Mauve Lilac	Not yet allotted	15.12.19	273	14	6,075	5·63	342·04	250	390
bilee Cherry's Fawn ..	,,	23.12.19	273	9½	4,866	6·28	305·68	250	348½

C. J. REID, Devenish. (Jersey.)

Completed since last report, 2. Certificated, Nil.

Miss S. L. ROBINSON, Malvern. (Jersey.)

Completed since last report, 2. Certificated, 1.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Werribee Island Starbright	Not yet allotted	2.12.19	273	7	3,501	5·73	200·51	175	228¼

J. H. ROGERS, Yarraville. (Ayrshire.)

Completed since last report, 5. Certificated, 4.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Bonnie of Glencairn ..	5640	3.10.19	273	18	5,473	3·71	202·83	175	231¼
Comely of Wethersdane ..	4154	6.10.19	273	4	7,378	4·29	316·90	250	361¼
Pearl of Riverside ..	6827	12.10.19	261	4	7,171	4·42	316·83	250	361¼
Ruby of Riverside ..	6835	20.12.19	273	22½	6,013	4·17	250·86	175	286

S. ROWE, Mt. Eccles. (Jersey.)

Completed since last report, 3. Certificated, 3.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Dunalister's Brighton Mite ..	Not yet allotted	2.10.19	273	12	4,589	5·41	248·51	175	283¼
Sweet Maid of Mt. Eccles ..	6236	5.10.19	273	11	4,475	5·16	231·15	175	263½
Lucy 7th of Mt. Eccles ..	6235	9.12.19	273	10½	4,984	5·54	276·18	175	314¾

F. W. SADLER, Camperdown. (Shorthorn.)

Completed since last report, 2. Certificated, 1.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Roan Ada 4th	Not yet allotted	22.10.19	273	6¼	7,922	3·54	280·39	200	319¾

SADLER BROS., Noorat. (Ayrshire.)

Completed since last report, 2. Certificated, 2.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Lady of Ecclefechan* ..	2308	24.9.19	246	4	8,197	4·29	352·09	250	401¼
Satinbird of Burnbrae ..	4621	13.10.19	273	24	8,177	4·45	363·74	200	414¾

* Inadvertently omitted from previous report.

A. H. S. SCHIER, Kernot. (Ayrshire.)

Completed since last report, 13. Certificated, 5.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Silverine of Inverleigh ..	5864	6.10.19	268	4	4,340	4·66	202·37	175	230¾
Boronia 2nd of Pine Grove	4626	29.10.19	240	4	5,013	4·51	226·32	200	258
Dolly Brown of Inverleigh ..	5854	9.11.19	273	17½	5,983	3·78	226·25	175	258
Mabel of Simpson House ..	5127	19.11.19	273	11½	5,575	4·75	264·95	200	302
Marguerite of Glengowrie ..	4632	19.12.19	273	15½	5,498	4·49	247·11	200	281¾

J. SCOTT, Chiltern. (Jersey.)

Completed since last report, 2. Certificated, 1.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Maitland's Petal	3338	23.12.19	273	18½	5,150	5·55	285·77	250	325⅞

A. SPIERS, Nalangil. (Ayrshire.)

Completed since last report, 1. Certificated, 1.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Holly of Ayrshire Bank ..	2066	12.10.19	273	9½	7,347	3·69	270·90	250	308⅞

O. J. SYME, Macedon. (Friesian.)

Completed since last report, 4. Certificated, 4.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Duplicate Posch Maud ..	Not yet allotted	8.10.19	264	4	11,937	3·52	420·24	250	479
Barbara of Brundee ..	,,	26.10.19	271	4	9,547	3·60	343·84	250	392
Bolobek Ruby	,,	27.10.19	273	9½	6,990	3·54	247·49	175	282¼
Bolobek Rhoda	,,	1.12.19	273	10½	11,316	3·32	375·81	250	428·42

H. WEBB, Narrewarren. (Ayrshire.)

Completed since last report, 7. Certificated, 2.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Miriam of Fernhill ..	4775	9.10.19	273	12	5,088	3·78	192·17	175	219
Lily of Holly Green ..	4772	21.10.19	273	16½	5,755	4·30	247·62	175	282¼

W. WOODMASON, Malvern. (Jersey.)

Completed since last report, 16. Certificated, 16.

Name of Cow.	Herd Book Number.	Date of Calving.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
				lbs.	lbs.		lbs.	lbs.	lbs.
Vanilla 11th of Melrose ..	Not yet allotted	27.9.19	273	14	6,205	5·83	361·95	200	412½
Jessie 15th of Melrose ..	5546	29.9.19	273	14	5,843	6·19	361·47	250	412
Vanilla 12th of Melrose ..	Not yet allotted	1.10.19	273	10½	4,076	6·11	249·09	175	284
Lassie Fowler 7th of Melrose	,,	19·10·19	273	16½	5,762	5·87	339·27	175	386¾
Laura 9th of Melrose ..	5551	24.10.19	273	17	6,498	6·68	434·29	250	495
Peerless 20th of Melrose ..	Not yet allotted	31.10.19	273	15½	5,114	5·64	288·68	175	329
Edith 6th of Melrose ..	,,	31.10.19	273	14½	5,485	6·08	333·31	200	380
Peerless 16th of Melrose ..	,,	2.11.19	273	10½	3,878	5·91	228·99	175	261
Gaiety Girl 8th of Melrose ..	5537	7.11.19	273	14½	6,021	5·54	333·85	250	380½
Jenny Lind 9th of Melrose ..	5543	17.11.19	273	19½	6,779	6·25	423·65	250	483
Graceful Duchess 11th of Melrose	4518	22.11.19	273	21½	6,377	6·06	386·80	250	440
Jessie 20th of Melrose ..	Not yet allotted	24.11.19	273	17½	5,988	6·54	391·21	200	446
Lassie Fowler 4th of Melrose	4522	26.11.19	273	20	8,355	5·18	433·44	250	494
Empire 5th of Melrose ..	4515	2.12.19	273	11½	5,691	5·09	289·63	250	330¼
Jessie 13th of Melrose ..	5544	4.12.19	273	16½	6,604	6·58	434·73	250	495½
Graceful Duchess 19th of Melrose	Not yet allotted	18.12.19	273	16½	5,066	6·41	324·83	175	370½

FARM NOTES FOR NOVEMBER.

EXPERIMENTAL WORK AT STATE RESEARCH FARM, WERRIBEE.

(*George S. Gordon, Science Field Officer.*)

Seasonal Conditions.

The greater part of November was mild to warm and sultry and the wet spring weather experienced in October continued during the month. Heavy falls of rain, amounting to 318 points, brought the total for the year to date up to 20.46 inches. Some idea of the precipitation at Werribee will be obtained by remembering that at the end of July the rainfall was almost 3½ inches *below* the average for the first seven months of the year while it is now about 1½ inch *above* the average, the shortage in July being more than made up by the abundant rains of over 3 inches per month which fell in August, September, October, and November.

Result on Crops.

The beneficial spring and early summer rains have helped to produce some very fine crops and, on the whole, the season may be described as distinctly good. The last two heavy falls of rain, however, not only tangled the crops in places but kept the ground in such a wet condition that the bulk hay crops were somewhat over ripe to make a good coloured sample when the ground was dry enough to carry the binders. Fortunately, the experimental plots were cut and stooked before the second rain and re-stooking was all that was necessary to keep the hay in good condition.

The rain also caused a few of the barley and oat plots as well as weak strawed wheat varieties to "lodge," and rust has since made its appearance in some plots. The season is thus proving a rather severe test for cereals with weak straw or with a tendency to suffer from rust. Gluyas, the earliest standard wheat which has been retained in the variety plots, and a new crossbred which had previously given promise of usefulness, "lodged" the worst. Federation seems to be affected with rust more than any other variety of wheat. A selection of crossbred oats—Wild Oats x Ruakura—showed considerable resistance to disease, and Pryor and Cape Barley have stood up to the conditions well.

Stripping has not commenced, but the barley and oat plots are almost ready and the grain of the early wheats is already fairly hard, while late varieties, such as Yandilla King, are losing their green colour and commencing to ripen. Summer forage crops such as lucerne, millet, Sudan grass, maize, &c., as well as sugar beet and pasture, have materially benefited by the rain and irrigation of these crops has not been necessary. Lucerne has made a very good growth, and the second "cut" for the season is now almost ready for harvesting on the experimental section.

Permanent Rotation Field.

The plots of oaten hay in this field were cut on November 7th and the hay was carted in and weighed on the last day of the month. The

following results speak for themselves regarding the advantages of crop rotation and fallowing:—

Results from Four Hay Rotations, Season 1920.

Plot No.	Rotation.	Yield per acre.	Remarks.
		cwt.	
1	Hay continuously	13·9	A crop every year
3	Hay after bare fallow ..	50·4	One crop in two years
6	Hay, Barley, bare fallow ..	58·9	Two crops in three years
9	Hay, Barley, Peas	26·2	A crop every year

Comparing Plots Nos. 3 and 6 (sown on bare fallow) with Nos. 1 and 9 (cropped continuously), the value of a well-worked fallow is at once apparent, while a comparison of the yields from Plots Nos. 1 and 9 (both continuously cropped) proclaims the advantage of crop rotation. In the case of Plot No. 9 where hay is grown in rotation with barley and peas, the yield is almost double that from Plot No. 1, where hay is grown year after year.

Plate No. I. gives a view of Plots 1 and 3, showing the whole of the hay (stooked) which the plots produced and representative samples from 2 square yards of each of these plots are shown in Plate No. II.

The other samples in Plate No. II. are from a similar area and representative of two wheat plots in the same field. These plots (24 and 26) were sown on the same day with a similar quantity of seed and fertilizer per acre. Sample No. 24 is from a very fine plot of Yandilla King wheat sown on bare fallow in alternate years; No. 26 is also from an area sown with Yandilla King wheat, but the crop was practically all wild oats, the result of sowing wheat year after year on the same plot.

The results afford further evidence in favour of bare fallowing and also indicate the poor yield obtained from continuous cropping with wheat. Another most striking feature of the continuously cropped plots is brought out by Plate No. II. The samples from Plots Nos. 3 (Algerian oats) and 24 (Yandilla King wheat) sown on fallow, are, as might be expected, free from wild oats; but it will be seen that there is a wide difference in this respect between the continuously cropped plots represented by samples Nos. 1 and 26.

Sample No. 1 (oaten hay) is almost free from wild oats. In fact, the plot is probably cleaner than it was when the experimental field was established; but Sample No. 26, instead of being wheat, is practically all wild oats, despite the fact that for several years an attempt was made to control the pest by hand pulling. As the sample indicates, wild oats have almost taken possession of the plot. Probably this is to some extent due to the fact that the oat plot is cut for hay some time before the wheat plot is stripped for grain. In the opinion of the writer, however, this would not account for such a wide difference in the growth of wild oats on the two plots, particularly as some of the

wild oats on the oat plot would shed during the hay-making and carting operations. The oaten hay plot is generally sown from about a month to six weeks earlier than the wheat plot, and during this period the latter would probably receive two extra cultivations at a time suitable for destroying weeds and germinating seeds. This should tend rather to keep the wheat plot 26 free from wild oats.

It would, therefore, seem that the continuous cropping with Algerian oats creates a condition which checks the growth of wild oats, or that the continuous cropping with wheat works in the opposite direction and encourages their development. The two cereals growing in the wheat plot may be a combination suitable to such a strong and early maturing plant as the wild oat, and perhaps this enables it to get ahead of the weak wheat plants resulting from continuous cropping. Seeing that at present there is such a super-abundance of wild oats on plot 26 one might almost wonder if a period will be reached when they will create a toxic condition inimical to their further development. Time

Plate 1.—Rotation Field.
Hay continuously—5 stooks. Hay after bare fallow—12 stooks.

alone can determine problems such as this, and the usefulness of a "permanent" experimental field becomes greater as time goes by.

Plate 2.—Representative Samples from Rotation Field.

No. 1. Hay (Algerian oats) continuously.
3. Hay (Algerian oats) after bare fallow.
24. Wheat (Yandilla King) after bare fallow.
26. Wheat (Yandilla King) continuously (practically all wild oats).

In addition to the benefits of crop rotation, &c., outlined above, there is also the suggestion that oaten hay growing may prove a useful factor in dealing with the wild oat problem.

BORDEAUX MIXTURE.

SHOULD IT BE ACID OR ALKALINE?

F. de Castella, Government Viticulturist.

In the spray mixtures which protect our vines and fruit trees from fungus pests, do we always apply the copper in the most advantageous form? The question is by no means new; it is one which has been repeatedly discussed during the past 35 years by leading authorities who have occasionally arrived at most contradictory conclusions.

In an article contributed to *La Revue de Viticulture* in May and June last, Jean Chauzit again reviews the subject in the light of the most recent knowledge. His conclusions, though altogether at variance with much that has recently been written, are of such importance that

a few extracts from his article should prove of interest to users of copper spray mixtures.

Before quoting his views, the history of copper spraying may be very briefly outlined. The first formula was that recommended by Millardet in 1885, consisting of 40 lbs. copper sulphate or bluestone and 75 lbs. lime to 50 gallons of water. The proportion of copper sulphate was progressively reduced until what may be termed the standard strength of 2%—10 lbs. bluestone to 50 gallons of water—was arrived at. For the past 20 years this has been the strength most generally applied in France. Sometimes the proportion of copper has been reduced to 1½%, whilst in years of severe mildew attacks it has occasionally been increased to 3%.

Concurrently with the reduction in copper, the proportion of lime used to neutralize it was also reduced. Millardet recommended nearly twice as much lime as copper. It was soon found that much less lime was sufficient, and for many years it has been usual for French vine-growers to employ half as much lime (by weight) as bluestone, though some formulæ, it is true, specify equal weights of bluestone and lime. The usual formula is—

Copper sulphate, 10 lbs.
Quicklime, 5 lbs.
Water, 50 gallons.

The mixture is made as follows:—The copper sulphate is first dissolved in 45 gallons of water; the lime is then slaked and made into a milk with 5 gallons of water: this is poured slowly into the copper sulphate solution with thorough stirring. It is important that lime should be poured into copper, not copper into lime.

The reaction which takes place is not nearly so simple as might at first sight appear; there are in reality a whole series of different reactions. If, to a solution containing 10 lbs. of copper sulphate, lime in the form of milk is gradually added, it will be found that the mixture will cease to be acid when 1.685 lbs. lime has been added but that it will not show any signs of alkalinity until the quantity of lime reaches 2.25 lbs. The change from acid to alkaline is thus not a sudden one. There is an intermediate stage between the cessation of acidity and first signs of akalinity during which the mixture is neither acid nor alkaline.

This seeming anomaly is explained as follows:—When lime is added to bluestone solution, the copper, instead of being precipitated in the form of hydroxide as was at one time supposed, is at first thrown out of solution as basic sulphates of varying composition, the most important being the tetracupric, pentacupric and dekacupric sulphates. With less than 1.685 lbs. pure quicklime (in the case mentioned above) tetracupric sulphate ($4\ CuO\ SO_3$) predominates. If the addition of lime be continued, further action takes place and sulphates of higher basicity are progressively formed as well as double sulphates of lime and copper. When the quantity of lime reaches 2.25 lbs. and the mixture is alkaline, double hydrates of lime and copper begin to make their appearance. At no time does the precipitate consist of one of these alone; it is a complex mixture of basic sulphates and, if enough lime be used, of double sulphates of lime and copper, and even of double hydrates of lime and copper.

Bordeaux can thus be acid, neutral, or alkaline, according to the relative quantities of lime and bluestone used. For 10 lbs. of copper sulphate in the solution, and provided the quicklime be pure and freshly burnt—

It will be acid with less than 1.685 lbs. lime.
It will be neutral with between 1.685 and 2.25 lbs. lime.
It will be alkaline with more than 2.25 lbs. lime.

It is evident that if the lime be of anything like good quality a mixture prepared according to the usual French method (half as much lime as bluestone) must necessarily be strongly alkaline.

Two of the most important properties of Bordeaux—in fact of all copper fungicides—are adherence and the power of progressively releasing minute quantities of soluble copper; it is these in fact which render copper such an ideal fungicide. They are to be met with in varying degrees according to composition and mode of preparation; the mixture which presents them in the highest degree is of course the one which will afford the greatest possible measure of protection.

It will be readily understood that a mixture leaving a sediment which adheres strongly to the tissues of the vine will protect for a longer time than one which is easily washed off by rain.

As regards soluble copper the question is rather more complex. Were the deposit left on the vine altogether insoluble it would not protect at all. Though practically insoluble at first it gradually releases, under the action of the carbonic acid contained in the air, soluble copper, mainly in the form of sulphate, in quantities which, though very minute, are sufficient to poison the raindrops on the surface of a properly sprayed vine, thus preventing the germination of any fungus spores which may fall into them and thereby preventing infection of the tissues of the vine.

Rather more than ten years ago Pickering questioned the efficacy of Bordeaux as usually made up, and pointed out that the tetracupric sulphate yields, when acted on by the carbonic acid of the air, a greater proportion of soluble copper than any other copper salt. He concluded that a mixture containing its copper as tetracupric sulphate was therefore to be preferred. Speaking of "Woburn-Bordeaux*" he says—

"Taking 2.8 per cent. as the average of the maximum percentage of copper liberated from ordinary mixture and comparing it with the 25-40 per cent. liberated from 'Woburn-Bordeaux,' the latter must evidently be from 9-14 times more effective than the former; or, to get the same effect with the Woburn as with the ordinary Bordeaux, we need use only one-ninth to one-fourteenth as much copper sulphate. Taking one-twelfth as a mean, the normal Bordeaux with 16 lbs. of copper sulphate to 100 gallons would be equivalent to 'Woburn-Bordeaux' with 1¼ lbs. to the 100 gallons."

Professor Sicard, of Montpellier, contributed an important paper on Bordeaux mixture to the International Viticultural Congress, held at Lyons, in July, 1914. He credits Pickering with having been the first to thoroughly investigate the composition of Bordeaux mixture. He states—

"That tetracupric sulphate is, among the numerous copper compounds which may originate from the action of lime on copper sulphate, the one with the greatest fungicide value, since this compound is capable of furnishing the greatest proportion of active copper under the action of carbonic acid."

*Note.—Woburn-Bordeaux was the mixture recommended by the Duke of Bedford and Professor Pickering in the Eleventh Report of the Woburn Fruit Farm. It contains its copper mainly as tetracupric sulphate.

If these views were correct the advocates of green (acid or neutral) as opposed to blue (basic or alkaline) Bordeaux were right, the method of treatment which for so many years had protected the vines of France was wrong, and a radical change was desirable. Some of the more progressive vineyard owners did, in fact, change their methods, adopting neutral or acid mixtures as recommended by Sicard. The lime-water Bordeaux recommended by Pickering was found in practice to contain too little copper for anything like adequate protection; it never came into practical use in France.

But the great mass of French vine-growers paid little or no heed to the new ideas. They continued to spray with the old-fashioned alkaline Bordeaux. In the light of the most recent knowledge they were right in so doing. The fine investigations of Pickering and his deductions are no doubt accurate, but he does not seem to have fully taken into account the practical requirements. The greater solubility of tetra-cupric sulphate and the greater release of soluble copper of which it is capable of are, in fact, its chief disadvantages, since they result in the total disappearance of the protecting reserve of copper much sooner than is the case with alkaline Bordeaux.

M. Chauzit describes the discussions which took place at the Lyons Congress in 1914, where Dantony and Vermorel expressed opinions different from those of Sicard, and considered that the different spray mixtures were effective regardless of their composition, but that if preference were to be given to one form it should be to alkaline Bordeaux. He describes the experiments conducted by Vermorel and Dantony in 1915-1916, the results of which were published in 1917.

Two blocks of vines were sprayed, one with acid and the other with alkaline Bordeaux. For a couple of weeks afterwards 100 leaves were gathered separately each day from each block, and the quantity of copper analyzed. The results were as follows:—

No. of Days since Spraying.	Total Copper (in milligrames per 100 leaves).		Soluble Copper in Water charged with Carbonic Acid (expressed in tenths of milligrames).	
	Sprayed with Acid Bordeaux.	Sprayed with Alkaline Bordeaux.	Sprayed with Acid Bordeaux.	Sprayed with Alkaline Bordeaux.
1 ..	230	228	400	160
2 ..	225	222	370	210
3* ..	40	212	10	260
4 ..	41	212	11	258
5 ..	40	207	10	256
6 ..	38	202	5	254
7 ..	34	203	4	252
8 ..	32	201	2	249
9 ..	32	190	1	249
10 ..	10	138	1	250
11 ..	6	185	0	246
12 ..	2	180	0	245
13 ..	2	179	0	242
14 ..	1	180	0	243
15 ..	1	188	0	242
16 ..	0	176	0	240

* Rain fell after the sample leaves were picked on the second day.

"On examining these comparative results, it will be seen that, at the start, the acid Bordeaux gave more soluble copper than the alkaline; but on the second day rain fell, and after this the alkaline Bordeaux contained 26 times as much soluble copper as the acid. The rain washed scarcely anything off from the alkaline Bordeaux, but it washed off nearly all the copper left by the acid. After the seventh day, the acid Bordeaux gave scarcely any more copper to protect the vine against mildew, whereas the alkaline Bordeaux contained, on the sixteenth day, as will be seen above, important quantities of copper (infinitely more than is necessary)."

In another series of experiment, Vermorel and Dantony compared the action of neutral and alkaline Bordeaux with results strongly in favour of the latter. So far as durability of action, the behaviour of the neutral mixture was very similar to that of acid, as will be seen below:—

No. of Days since Spraying.	Total Copper (in milligrames per 100 leaves).		Soluble Copper in Water charged with Carbonic Acid (expressed in tenths of milligrames).	
	Sprayed with Neutral Bordeaux.	Sprayed with Alkaline Bordeaux.	Sprayed with Neutral Bordeaux.	Sprayed with Alkaline Bordeaux.
1 ..	250	285	290	190
2 ..	255	282	275	233
3 ..	228	282	265	245
4 ..	197	276	255	250
5 ..	179	240	225	238
6 ..	171	210	220	225
7* ..	28	169	38	210
8 ..	14	167	21	210
9 ..	15	165	22	212
10 ..	11	150	16	204
12 ..	10	130	4	204
14 ..	6	121	2	196
16 ..	1	116	Traces	196
20 ..	Traces	113	Traces	194
25 ..	Nil	106	Nil	193
30 ..	Nil	104	Nil	185
40 ..	Nil	102	Nil	154
50 ..	Nil	99	Nil	155

* Rain fell after the sixth day.

"It will be seen from the above that the total quantity of copper is the same during the three first days; on the fourth, fifth, and sixth day, the copper of the neutral diminishes more rapidly than that of the alkaline Bordeaux. Heavy rain fell after the sixth day, causing the proportion of copper left by the neutral Bordeaux to collapse from 171 to 28, whereas that of the alkaline only fell from 210 to 169. After the fifteenth day, the copper of the neutral Bordeaux is insignificant. . . . After the eighth day, there is no longer enough present to protect against mildew. On the contrary, the alkaline Bordeaux provides more copper after the fiftieth day than the neutral after the seventh.

In practice, it results from the above that, after rain, acid and neutral Bordeaux are no longer capable of defending the vines against mildew, whereas alkaline Bordeaux, notwithstanding the rain, lasts strongly on the leaves, in quantity, more than sufficient to defend the vines."

It will thus be seen that, in accordance with the opinions of Pickering and Sicard, acid and neutral Bordeaux yield rather more soluble copper during the first few days after spraying; but alkaline Bordeaux soon catches up and even surpasses them in this respect, whilst the protecting reserve of copper left by it on the vine is far more

lasting and, what is particularly important, very much less liable to removal by rain.

Alkaline Bordeaux also permits the addition of Casein, the value of which, to increase wetting power and adherence, is well known; Casein cannot be added to an acid mixture, by which it would be curdled.

The foregoing also constitutes striking evidence in favour of the superiority of Bordeaux (Copper-Lime) over Burgundy (Copper-Soda). The latter must be neutral or slightly acid if scalding of foliage is to be avoided*. Acid and neutral copper-soda, however, contain their copper mainly as basic sulphates which, as shown above, afford much less lasting protection than the precipitate present in alkaline Bordeaux.

* The leaf injury caused by alkaline copper-soda is not due to excess of soda, which does not itself scald the foliage of the vine. It is the copper-carbonate, always present in alkaline copper soda, which causes injury.

TYPE: AND BURNLEY EGG-LAYING COMPETITION.

(Continued from page 694.)

A. V. D. Rintoul, N.D.D., Chief Poultry Expert.

Are the Club Standards Practicable for Utility Purposes?

A valuable contribution to utility-poultry keeping literature has been made available by the Department of Agriculture for New Zealand by the publication of *The Dominion of New Zealand Utility-poultry Standards*, a copy of which was kindly sent to me by Mr. J. B. Merrett, editor of the *New Zealand Poultry Journal*. The Chairman and Secretary of the Conference (held to determine the standards adopted) state that, after careful deliberation, the Conference decided *it could not do better than take the text of the English poultry standards as its basis or starting point*, with such modifications and additions as the practical working of the industry had shown to be necessary. The alterations in the text were astonishingly few, and consisted mainly of such as were required to emphasize certain practical points in the conformation of the hen especially, which the numerous egg-laying competitions and the experience of utility-poultry breeders had shown to make for superior productiveness and prolific laying.

The conclusion to be drawn from this fact seems to be that the absurdities, from a practical poultry-keepers' point of view, sometimes seen in the judging of poultry at Shows arise not so much from the text of the standards as from the faulty interpretation put thereon by judges.

Instructions to Judges (New Zealand).

The following are the instructions to judges issued by the New Zealand Department of Agriculture, as printed in the publication referred to above:—

The merit of specimens shall be determined by a careful examination of all the essentials in the "Scale of Points," beginning with type, and continuing through the list, deducting from the full value of each section of a perfect bird for such defects as are found in each specimen. Judges must consider carefully each and every section of the specimen, and not allow colour alone, or a specimen excelling only in head-points.

to influence their decisions. The vital importance of typical shape of the breed that is being adjudicated upon is to be borne constantly in mind, at the same time giving due consideration to colour in all sections, including under-colour.

In determining size, the judge shall decide by comparing the specimens in competitions with due regard to weight in all breeds and varieties as specified in the standard. When a bird fails to attain to, or in case it exceeds, the size proportionate with the type or shape it must be discounted quite severely. It is desirable that the judge recognise and reward those specimens that come nearest to the ideal in shape, size, and weight, still giving the important and vital matter of correct plumage full credit.

A specimen in any breed falling more than 1 lb. below weight or weighing more than 1½ lbs. overweight shall be passed.

Exhibits with any feather, feathers, or stubs on shanks or feet, or unmistakable indications of feathers having been plucked from same, must be passed.

A wing showing clipped flights or secondaries, or both, shall make the specimen ineligible for competition.

Faking in any manner shall disquality the specimen.

The entire absence of main tail-feathers or absence of feathers from secondaries or primaries is a serious defect, and a specimen with only one sickle is to be penalized eight points.

The comb on a male specimen which merely turns over a trifle from the natural upright position is not to disqualify; but the comb of a female which unduly obstructs the sight must be passed.

A specimen in any breed exhibited in a dirty condition, infected with insects, or legs badly affected with scales must be passed.

A Contributing Factor to the Loss of Type.

Lack of sufficient rearing ground for chickens is one of the most noteworthy reasons for a tendency to degeneracy, and this is one of the grave objections to a flock of 50 or so fowls in a small backyard. Several seasons may, perhaps, elapse before the results become marked, but loss of stamina will inevitably appear sooner or later.

Apart from this fact, the suburban owner of from 30 to 50 birds is somewhat of a menace to the industry because of his comparative unconcern in the matter of disposal of surplus eggs. This class of poultry keeper is usually content to hand his eggs over to the local grocer, who pays what he feels inclined. Until *all* poultry keepers combine to secure full value for their products, the industry will not be raised to its rightful place.

The Status of the Small Flock Owner.

Many large poultry farms have been built up from small beginnings, and undoubtedly it is best to start in a small way; but, at the same time, the man who has accommodation for only a very limited number of birds is not usually desirable as a stud breeder. Considerable range is necessary for growing stock, and unless this is available degeneracy will set in. Burnley Competition has frequently been won by a small breeder, perhaps even a beginner who has a small, but select, breeding pen. The temptation is great to at once launch out in order to cope

with the large number of stud sales that follow a win at "headquarters." This means, for the man with the small area, serious overcrowding, and the purchasers are thereby likely to suffer in their future breeding operations. While the Competition is open to all, and can, therefore, be won by anybody, stud buyers should be more particular than they are at present about buying birds that have not been brought up on free ranges.

The breeder in the small way has the advantage that he can breed separately from *each* of his birds, and by keeping accurate records can rely with some confidence on the prospects of his pullets. The man in a large way cannot very will "single-test" all his breeders, but he has the advantage of free range. To my mind, the progeny of 300 egg stock, badly reared, have no chance against the progeny of 250 egg flock matings reared under suitable conditions, and the rearing conditions must receive more attention from buyers in the future than hitherto.

(To be continued.)

SPECIFICATIONS FOR A BRICK AND CONCRETE TROUGH.

By J. Wilson, Silo Builder.

Level off ground for a space of 20 feet x 4 feet. Sink a trench 9 inches deep x 12 inches wide in a space 19 ft. 6 in. long x 3 ft. 6 in. Fill in trench with concrete made up of 5 parts gravel, 3 parts sand, and 1 part cement; ram lightly, and allow same to set firmly. Lay bricks, as shown in illustration on opposite page, in a composition of 3 parts sand and 1 part cement. The second row of bricks are to be laid to form a 4½-inch projection on inside of each wall, on which a 2-inch x 1-inch plate is laid, as shown on plan. To these plates fasten a covering of 6-inch x ½-inch hardwood to carry the concrete floor of trough; allow 2½ inches on each side of the casing for concrete to set on the projection. Now lay third row of bricks, fill in on platform up to the top of bricks concrete made of 3 parts gravel, 2 parts sand, 1 part cement. Lay wire netting on top of concrete, with a 3-inch lap on bricks; lay fourth row of bricks; then fill in on wire netting 1½ inches of concrete; set in on this layer of bricks hoop-iron to hold top plate, as shown on plan; lay two more rows of bricks, and then fix top plate of 4½ inches x 3 inches hardwood. A stiffener of 4½-inch x 3-inch hardwood should be fixed at the centre of trough. A 2-inch plug should be set in the concrete floor, so that trough may be emptied and cleaned.

Material Required.

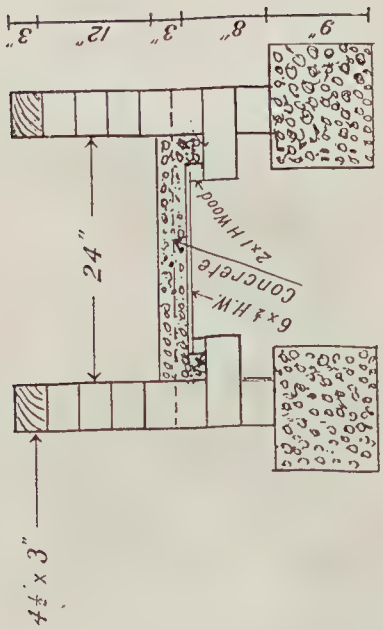
Bricks, 426.

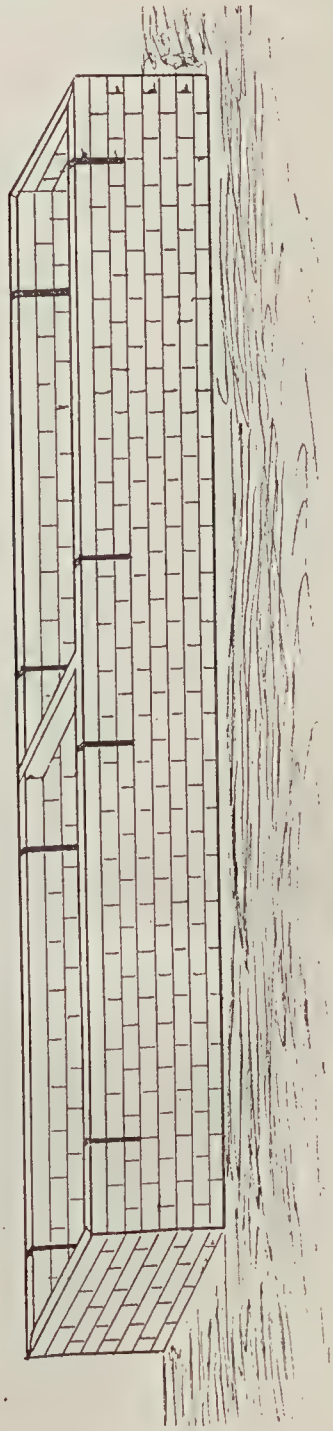
Wire netting, 19 feet x 2 ft. 6 in., 2-inch mesh.

Hardwood—6 x 1½, thirty-two 20-inch; 4½ x 3, two 19-feet, three 3-feet; 2 x 1, two 18-feet.

Hoop-iron, 2-inch x 22 gauge, eight 2-feet.

Gravel, 2 yards; sand, 1 yard; cement, 2 casks.


3"
12"
3"
8"
9"
24"
2 x 1 Wood
Concrete
6 x 4 H.W.
4' x 3"



STALLIONS REGISTERED FOR 1920-21,

under the Horse Breeding Act.

2nd List.

From September 25th to November 16th, 1920 (inclusive).*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
779	Abbots Pride ..	A	Draught ..	M. McLeod ..	Condah Swamp
749	Aberdeen	A	Thoroughbred	C. T. Lucas ..	Pomborneit
964	Ace of Spades ..	A	Light ..	A. Small ..	Ballarat
1052	Admiral Speary ..	A	Draught ..	C. Hill ..	Gama
771	,, Wood ..	A	Light ..	W. J. Tomkinson	Seymour
760	Alex R.	A	,, ..	C. L. Lutze ..	Long Plain
825	All Tricks ..	5	,, ..	Mrs. J. C. Millard	Condah
794	Almont Rose ..	A	,, ..	P. Dermondy ..	Dunolly
993	Altona	4	,, ..	A. Robertson ..	Laverton
917	Ambershine ..	A	,, ..	L. A. Gunsser ..	Ballarat West
836	Argyle	A	Draught ..	F. McRae ..	Wallup
791	Aristocrat ..	A	Light ..	R. Price ..	Wallacedale S.
1002	Badaween ..	A	,, ..	B. F. Sandford ..	Lysterfield
808	Balnakill	A	Draught ..	R. J. Thomson ..	Brim
920	Baron Alexander ..	5	,, ..	A. F. Russell ..	Hesse
731	,, Argyle ..	A	,, ..	W. Hegarty ..	Donald
860	,, Brae ..	4	,, ..	S. H. Wilson ..	Katamatite
1059	,, Clyde ..	A	,, ..	Cunnington Bros.	Bamawm
851	,, Crombie ..	3	,, ..	J. J. Power ..	Strathallan
830	,, Mac ..	4	,, ..	J. Branson ..	Lake Cooper
900	,, Primrose ..	2	,, ..	T. Shanahan ..	Myrniong
767	Baron's Son ..	A	,, ..	G. J. Butler ..	Carisbrook
1057	Baron Twist ..	A	,, ..	E. W. and W. S. Ham	Pannooba-mawm
761	Basil B.	A	Light ..	W. A. Reidell ..	Tongala
1001	Belmont's Champion	A	Draught ..	Turner Bros. ..	Mernda
929	Benjamin 2nd ..	6	,, ..	J. J. Hyder ..	Galah
963	Ben Marcelene ..	A	Light ..	F. A. Cox ..	Geelong
857	Bevenski	A	Thoroughbred	H. Maclure and Co.	Condah
813	Biddulph Bondsman	A	Draught ..	R. J. Green ..	Winton
887	Billy	4	Pony ..	G. Howlett ..	Murtoa
811	Black Bolt ..	A	,, ..	J. R. McBean ..	Goroke
858	Blackboy	A	Light ..	J. Killean ..	Sale
780	Black Imp ..	A	Pony ..	F. M. Orton ..	Murmungee
937	Bold Agitation ..	6	Draught ..	J. E. Edes ..	Kensington
817	Bold Newton ..	A	,, ..	J. R. Mitchell ..	Sandford
961	Bonnie Doon Junior	A	Pony ..	D. H. Hallett ..	Omeo
790	Bonnie Scotchman	A	Draught ..	R. Price ..	Wallacedale S.
871	,, Wizard ..	6	Pony ..	W. Morey ..	Katandra N.
873	Bon Wickliffe ..	6	Light ..	J. Ford ..	Wickliffe
733	Boro Albert Victor ..	A	Draught ..	J. A. Cuthbert ..	Congupna
988	Boxer	6	,, ..	G. L. Curtis ..	Wangaratta
730	Bramhope Monarch	A	,, ..	G. Hicks ..	Miram
883	,, Royal William	A	,, ..	G. Wilson ..	Talgarno
1038	Breedon Pioneer ..	A	,, ..	M. C. Ryan ..	Chetwynd

* For Registrations prior to September 25th, see *Journal of Agriculture*, October, 1920, pp. 622-634.

STALLIONS REGISTERED FOR 1920–21—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
729	Brydon	A	Draught ..	J. A. Stephenson	Gelliondale
738	Canary's Pride ..	A	Pony ..	Mrs. M. A. Jones	Speed
719	Canny	3	Thoroughbred	T. A. Griffiths ..	Glenrowan
768	Captain Llewellyn ..	A	Light ..	H. Bullock ..	Hamilton
1051	Celmar Style ..	3	,, ..	W. Cochran and Sons	Pootilla
884	Champion Again ..	A	Draught ..	W. J. Westendorf	Nhill
859	Charlie 2nd ..	A	,, ..	C. E. Warren ..	Narioka
1023	Chieftain	4	,, ..	H. Gilmour ..	Thornton
842	Cicero	A	,, ..	R. Lloyd ..	Kyabram
874	Claredon	A	Pony ..	Bennett Bros. ..	Coleraine
877	Clarey	A	,, ..	J. Jones ..	Mywee
816	Clarionet	A	,, ..	J. R. Mitchell ..	Sandford
863	Clyde Laddie ..	5	Draught ..	J. Alexander ..	Caniambo
784	Cock Robin ..	A	,, ..	P. H. Beaton ..	Kornalla
953	Colonel Jock ..	4	,, ..	A. Neivandt ..	East Shelbourne
764	Commonweal ..	A	,, ..	W. C. Holt ..	Foster
865	Congress	A	Pony ..	J. Reid ..	Warrion
778	Contractor ..	A	Light ..	J. T. Ovens ..	Cooma
758	Copper King ..	A	Pony ..	C. W. Sharp ..	Colac
908	Cremoran's Pride ..	A	Draught ..	C. C. Mengler ..	Linga
723	Cronje Wilkes ..	A	Light ..	C. B. Mackie ..	Camperdown
762	Cyanide	A	Pony ..	A. Sutherland ..	Welshpool
823	Cyndett 2nd ..	A	,, ..	G. J. Marshall ..	Burnley
890	Dalbora	2	Draught ..	W. Bunworth ..	Watchupga
911	Dandenong ..	2	Pony ..	R. C. Ladlaw ..	Dooen South
962	Dandy	A	,, ..	R. Morse, jun. ..	Mirboo North
1037	Dandy	A	,, ..	P. Purves ..	Rosebud
879	,, Again ..	A	,, ..	J. W. Henderson	Weatherboard
854	,, Jack ..	A	,, ..	G. Gunn ..	Raywood
1031	,, Nut ..	A	,, ..	E. E. Small ..	San Remo
893	Dan Patch Junior ..	A	Light	J. McCormick ..	Knowesley
864	Deck Top ..	4	,, ..	Mackin Bros. ..	Korong Vale
894	Denmark	A	Draught ..	A. S. Pepper ..	Melbourne
827	Direct Harry ..	A	Light ..	J. Rousch ..	Cohuna
1006	,, Lulu ..	A	,, ..	R. London ..	Maldon
1028	Director	A	Pony ..	Quinn Bros. ..	Elmore
902	Don Abbey ..	A	Light ..	M. E. McMurtrie	Albert Park
828	Drummond King ..	A	Draught ..	H. and G. Holland	Piabella
1050	Duke Little Eyes ..	5	,, ..	A. E. Bowman ..	Ebden
880	Dun Robin ..	A	,, ..	J. W. Peake ..	Elmhurst
904	Dunsby's Pride ..	A	,, ..	J. B. Baldwin ..	Gre Gre Village
982	Earle	4	Light ..	N. S. Lett ..	Sale
878	Earlmont	A	,, ..	A. J. Snow ..	Cooma
847	Eaton Headlight ..	2	Draught ..	E. W. Schneider	Yulecart
924	Echelon	A	Light ..	H. T. Nicholas ..	Lower Thornton
740	Eltham	A	,, ..	Mrs. C. Barr ..	Archdale
1015	Enfield	A	Draught ..	A. S. Brewis ..	Penshurst
981	Ercildoon Dick ..	A	Light	D. Gardner ..	Milawa
1009	Everest Dale ..	A	Draught ..	E. J. Rickey ..	Dean
951	Fairhaven ..	A	,, ..	H. Harbour ..	Amphitheatre
728	Fashion Direct ..	A	Light ..	T. F. Hogan ..	Sand Hill Lake
949	Fashion's Model ..	A	Draught ..	A. B. Hamilton	Fish Creek
1024	Federal Duke ..	A	,, ..	J. Hendry ..	Bridgewater
746	Field Ambulance ..	A	Light ..	G. Collis ..	Alberton
744	First Shot ..	2	,, ..	W. G. Rigby and Sons	Piavella

STALLIONS REGISTERED FOR 1920-21—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
935	Flash Dillon ..	A	Light ..	M. Curtis ..	Nth. Richmond
901	,, Jack ..	A	,, ..	W. J. Campbell	Horsham
1039	Forest King ..	A	Draught ..	J. M. Hopkins ..	Yinnar
802	Future	A	Pony ..	C. E. Roberts ..	Echuca
966	Futurist	5	,, ..	R. T. H. Clarke ..	Lancefield Junction
858	Gallant Lad ..	A	Draught ..	A. A. S. Mitchell	Hopetoun
807	Galtimore ..	A	Light ..	T. Walsh ..	Dargo
766	Gay Garland ..	A	Draught ..	F. McCrae ..	St Albans
984	,, Lad	A	,, ..	J. Archibald ..	Sale
1032	,, Voyage ..	6	Light ..	P. A. Beaumont	Ouyen
1018	General Hamilton ..	A	Draught ..	O. Vince ..	Minyip
891	,, Harvey ..	6	,, ..	Koschitzke Bros.	Bangerang
1055	,, Ribbonwood	6	Light ..	A. Simpson ..	Moorabbin
980	,, Scott ..	A	Draught ..	A. Strawhorn ..	Edgecombe
950	Geneva's Spark ..	4	Light ..	G. G. Huf ..	Lancefield Junction
1034	Gillies' Son ..	A	Draught ..	Boyd Bros. ..	Koroit
938	Glengarry ..	6	Pony ..	A. R. Dalton ..	East St. Kilda
826	Glengeariff ..	3	,, ..	G. Collis ..	Alberton
720	Glenroy	A	Draught ..	E. W. Waters ..	Echuca
1060	Gnarpost	4	Light ..	P. B. O'Keefe ..	Rutherglen
986	Gold Dust ..	A	,, ..	J. A. A. Birss ..	Stradbroke
757	,, Dust ..	A	,, ..	W. E. Mayberry	Nurcoung
777	Goldenwood ..	A	,, ..	J. T. Ovens ..	Cooma
954	Gossoon Bells ..	A	,, ..	W. Leach ..	Rheola
979	Gunplay	A	Thoroughbred	J. Brennan ..	Binloch
931	Happy Bells ..	A	Light ..	W. H. Bell ..	Beechworth Junction
1004	,, Binnia ..	A	,, ..	E. H. Nolte ..	Merino
965	Heather King ..	A	Draught ..	Oliver Bros. ..	Rutherglen
996	Hercules	A	,, ..	E. Storer ..	Wallacedale North
970	Hero 2nd	A	Pony ..	Greaves Bros. ..	Yannathan
1053	Highland Fancy ..	6	Draught ..	G. Hildebrand ..	Leitchville
773	His Majesty ..	A	,, ..	M. Frawley ..	Leigh Creek
727	Honourable ..	A	Light ..	A. Collyer ..	Moe
975	Hotspur	A	Pony ..	Z. L. Small ..	French Island
821	Hullaballoo ..	A	Light ..	M. Brooks ..	Ultima
1054	Huon Lad.. ..	2	Pony ..	C. S. Wade ..	East Kew
763	Ian Dhu	A	,, ..	N. C. Gibson ..	Jeel South
834	Invincible ..	A	Draught ..	J. F. Ryan ..	Bearii
741	Jack	6	Light ..	J. Tyers ..	Numurkah
867	Jack	A	Pony ..	P. Lawrie ..	Rushworth
985	James Osterley ..	A	Light ..	F. R. Stiles ..	Mt. Moriac
888	Jock	A	Draught ..	G. T. Wolstenholme	Milawa
1016	Jubit	A	Light ..	P. J. Kelly ..	Hinnomunjie Bridge
772	Kelm Pride ..	5	Draught ..	R. R. Woonton	Chinkapook
789	Kelm's Best ..	A	,, ..	R. Fraser ..	Mirboo North
798	Khamseem ..	3	Light ..	S. Winter Cooke	Hamilton
734	King Albert ..	A	Draught ..	T. McKay ..	Malmsbury
835	,, Douglas ..	3	,, ..	McCrabb Bros. ..	Wunghnu
803	,, Edward ..	A	,, ..	J. G. Wilson ..	Milawa
724	,, Jimmy 2nd ..	A	Pony ..	R. H. Larcombe	Mt. Moriac
957	,, Murillo ..	A	Thoroughbred	A. E. Fisher ..	Lilydale

STALLIONS REGISTERED FOR 1920–21—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
936	King of the Roses 2nd	Yrs 4	Draught ..	D. Kenneally ..	Longwarry South
805	„ of the Valley ..	A	„ ..	C. J. Woodyard	Whitfield
815	„ Osterley ..	A	Light ..	J. J. Kennerley	Northcote
960	King's Own ..	A	Draught ..	J. Denham ..	Mirboo North
795	Kitchener ..	6	„ ..	Agricultural College	Dookie
732	Knight of the Garter	A	„ ..	P. McDonald ..	Nagambie
833	Lanark's Pride ..	A	„ ..	W. Etherton ..	Broughton
1027	Larrikin	A	Light ..	H. Sutherland ..	Pier Millan
743	Lee Creek Squire ..	A	Draught ..	W. Underwood ..	Larpent
849	Leo	A	Pony ..	T. Burt ..	Clifton Hill
1029	„ Prince ..	A	„ ..	A. J. Peters ..	Foster
810	Lieutenant J. ..	A	Light ..	G. Smith ..	Pirron Yallock
944	Little Argyle ..	A	Pony ..	W. H. Lyon ..	Sale
971	„ Bill ..	5	Light ..	A. T. Corner ..	Fosterville
989	„ Jim ..	A	Pony ..	S. A. Reddie ..	Princetown
797	„ Lonsdale ..	A	„ ..	J. J. Mahoney ..	Coleraine
956	„ Mickey ..	A	„ ..	C. Simon ..	Leongatha
913	„ Milton ..	5	Draught ..	J. Hives ..	Tempey
824	„ Wonder ..	A	Pony ..	G. C. Roughead	Ruby
792	Loch Albyn ..	A	Draught ..	J. J. Moylan ..	Cosgrove
742	Lord Armadale ..	A	„ ..	E. Roberts ..	Essendon
809	„ Bally ..	6	Pony ..	G. Smith ..	Pirron Yallock
943	„ Chancellor ..	A	Draught ..	W. Flack ..	Daylesford
925	„ Clarrie ..	A	Pony ..	C. C. Dawkins ..	Lismore
899	„ Dundee ..	A	Draught ..	C. Lippiatt ..	Scotsburn
786	„ Huntly ..	A	„ ..	A. W. Butcher ..	Ballendella
1011	„ Ronald ..	A	„ ..	E. J. Rickey ..	Dean
941	„ Welkin ..	4	Light ..	N. Boyd ..	Franklinford
898	Lucky Charm ..	A	Draught ..	D. Williamson ..	Wendouree
983	Lymn Truffle 2nd ..	3	„ ..	W. A. Tyrrell ..	Yarragon
726	Lyndale	A	„ ..	H. Conn ..	Barrakee
799	Major Again ..	3	„ ..	H. M. Bywater ..	Nhill
872	„ Lawrence ..	A	„ ..	M. Parnell ..	Katamatite
987	„ Thornley ..	4	„ ..	T. Torpey ..	Turriff
967	Markhope ..	A	Thoroughbred	R. T. H. Clarke ..	Lancefield Junction
870	Marmaduke ..	A	Pony ..	A. J. Gillies ..	Noorat
793	Master Brigham ..	A	„ ..	J. Jackson ..	Camperdown
972	„ Valve ..	A	„ ..	A. Lang ..	Castlemaine
812	Mauritius	A	Light ..	J. B. Zander ..	Melbourne
1047	Memsie Boy ..	2	Draught ..	J. B. Ferguson ..	Waubra
718	Metal Bells ..	2	Light ..	W. G. Pharoah ..	Warragul
921	Mirrabooka ..	A	Thoroughbred	A. F. Russell ..	Hesse
1041	Model Prince ..	A	Draught ..	J. Gifford ..	Beazley's Bridge
885	Model's Fancy ..	A	„ ..	Hutcheson Bros.	Pine Grove
994	Moeser	3	„ ..	K. MacInnes ..	Lake Bolac
837	Monty	6	Pony ..	W. H. Morris ..	Woolsthorpe
862	Moray's Pride ..	3	Draught ..	A. J. Yeaman ..	Tennyson
717	Mountain Palm ..	A	Light ..	E. J. Lukey ..	Warracknabeal
1045	Murundi	A	Pony ..	A. E. Bowman ..	Ebden
875	My Own	A	„ ..	J. Minns ..	Melton
1007	Napoleon	5	Draught ..	S. J. Lewis ..	Baringhup
801	Native Prince ..	A	„ ..	R. McKenzie ..	Woodford
1012	Newton Main ..	A	„ ..	J. A. G. Wilson	Kenilworth

STALLIONS REGISTERED FOR 1920–21—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
923	Norval Junior ..	A	Light ..	J. English ..	Bulart
755	Oakland's Pride ..	A	Draught ..	C. F. Dolan ..	Ouyen
997	Odd Patch ..	A	Light ..	G. H. Finlay ..	Almurta
800	Orbost Again ..	A	Draught ..	G. T. Deckert ..	Kinimakatka
934	Orderley Wilkes ..	6	Light ..	A. R. Dalton ..	East St. Kilda
787	Osterley Again ..	A	,, ..	G. Lewis ..	Linga
843	Oster Direct ..	6	,, ..	J. Corry ..	Barmah
776	Ostrich 2nd ..	A	,, ..	J. T. Ovens ..	Cooma
1042	Owyhee Chief ..	A	,, ..	J. Shanahan ..	Richmond
909	Patchwork ..	A	,, ..	H. Milte ..	Lascelles
754	Phylactery ..	A	Thoroughbred	A. B. Gibbons ..	Cohuna
973	Piper	A	Pony ..	J. Ford ..	Wickliffe
939	Planet Boy ..	A	Light ..	C. Butcher ..	Chillingollah East
856	Pleasant Voyage ..	3	,, ..	W. Maloney ..	Mooroopna
977	Polo King ..	A	Pony ..	W. H. J. Baker	Portland
759	Powisland Pure Blood	A	Draught ..	S. Coombs ..	Numurkah
775	Pride of Lochiel ..	A	,, ..	J. T. Ovens ..	Cooma
1040	,, the Ponds	A	,, ..	E. Drayton ..	Waurn Ponds
866	,, the South	A	,, ..	Mrs. S. E. Kent	Sheep Hills
995	Prince Arthur ..	3	,, ..	Starrock Bros. ..	Mooroopna
850	,, Binnia ..	A	Light ..	C. Nulte ..	Merino
840	,, Charlie ..	A	Draught ..	K. P. O'Brien ..	Rochester
919	,, Clifton ..	2	,, ..	W. Dugdale ..	Bacchus Marsh
886	,, Coupar ..	A	,, ..	J. Archibald ..	Whitfield
751	,, Harold ..	A	Light ..	C. E. Darley ..	Hopetoun
737	,, of Lorne ..	A	Draught ..	E. H. P. Young	Congupna
1043	,, William ..	A	,, ..	W. R. Berger ..	Devenish
1022	Prince's Ribbon ..	A	Light ..	W. A. Riedell ..	Tongala
804	Principal	A	,, ..	J. Kosch ..	Byaduk
748	Rael Locin ..	A	Thoroughbred	J. Nicol ..	Agnes
940	Ragged Jacket ..	A	Draught ..	Foster Bros. ..	Maffra
806	Ranfurly	A	,, ..	L. C. Colyer ..	Goroke
782	Reality Rex ..	A	Pony ..	J. Archibald ..	Pannooba-mawm
978	Red Cloud ..	A	Light ..	A. E. Charman ..	Lucknow
869	Reform	6	Light ..	J. Branson ..	Lake Cooper
926	Regis	6	Draught ..	E. Manifold ..	Camperdown
753	Rhymney ..	A	Pony ..	G. O'Brien ..	Cowwarr
992	Rhysharold ..	A	,, ..	A. H. Hunt ..	Lancefield
829	Ribbonwheel ..	A	Light ..	V. Vaughan ..	Condah
969	Robin Gray ..	A	Pony ..	T. H. Phiddian ..	Goon Nure
1035	Rob Shanter ..	A	,, ..	Boyd Bros. ..	Koroit
736	Roseneath Royal ..	2	Draught ..	W. G Wilkinson	Witby
999	Royal Belmont ..	A	,, ..	Turner Bros. ..	Mernda
896	,, Ben ..	A	,, ..	J M Hamilton	Inverleigh
861	,, Blue ..	A	,, ..	J J. Ryan ..	Port Fairy
1019	,, Flush ..	A	,, ..	Jas. Rochford ..	Byaduk
722	,, Prince ..	A	,, ..	C. E. Umbers ..	Sea Lake
785	,, Prince ..	2	,, ..	J. J Gleeson ..	Southern Cross
946	,, Saxon ..	A	,, ..	J. M. Hunter ..	East Kew
781	Siam	A	Light ..	J. W. Smith ..	Elmore
735	Scotland's Viceroy ..	A	Draught ..	J Bunge ..	Sheep Hills
918	Scotland Yet ..	A	,, ..	A. E. Capron ..	Lethbridge
1020	Scottie	A	Pony ..	Jas Rochford ..	Byaduk
855	Several	A	Thoroughbred	N Boyd ..	Franklinford
848	Shifty Dick ..	A	Light ..	J. Foster ..	Casterton
903	Silver Bells ..	A	,, ..	T. Coonerty ..	Yarragon

STALLIONS REGISTERED FOR 1920-21—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
1058	Silver Claim ..	A	Thoroughbred	M. Hutcheson ..	Pine Grove
630	,, King ..	A	Light ..	D. A. Hopkins ..	Fulham
907	,, ,, ..	6	Pony ..	G. Pyers ..	Yawong
895	Sir Angle	A	Light ..	A. A. Lee ..	Tallangatta
1033	,, Burnhead ..	A	Draught ..	Boyd Bros. ..	Koroit
788	,, Don Pedro ..	A	,, ..	J. McKee ..	Clarendon
756	,, Everest ..	3	,, ..	A. Ralston ..	Lucknow
974	,, George.. ..	4	Pony ..	I. K. Russell ..	Hesse
838	,, Richard 2nd ..	A	,, ..	W. Henderson ..	Grasmere
841	,, Robert Newton ..	3	Draught ..	P. Lowrie, jun. ..	Rushworth
750	,, Roderick ..	A	,, ..	W. Burn ..	Trentham
945	,, Thomas ..	A	,, ..	W. H. Lyon ..	Sale
819	Skipper	A	Pony ..	G. Hicks ..	Strathallan
868	Snapshot	4	Light ..	H. Crawford ..	Victoria Valley
769	Southern Chief ..	A	Draught ..	J. McKenzie ..	Dimboola
928	Splendour ..	A	Light ..	J. McKenna ..	Picola
841	Springbank Lawrence	5	Draught ..	W. H. Crawford	Hamilton
747	Standish Direct ..	A	Light ..	T. Kelly ..	Barraport
852	Starlight	A	Draught ..	J. Fuller ..	Mitre
906	Stockman's Lad ..	5	,, ..	S. Perkins ..	Ouyen
1008	Strathroy	A	,, ..	W. G. Ballintine	Cosgrove
947	Stylish Laddie ..	4	Light ..	A. E. Miles ..	Drouin
796	Sydney Derby ..	6	,, ..	H. J. Stevens ..	Northcote
846	Tamfield	4	Draught ..	E. J. Hickson ..	Muskerry East
948	The Abbot ..	A	Light ..	A. B. Hamilton	Fish Creek
1014	,, Crown ..	A	Draught ..	S. Atwell ..	Rainbow
990	,, Fashion ..	A	,, ..	P. Purves ..	Rosebud
832	,, General ..	A	Light ..	D. Shelley ..	Bungaree
853	,, General ..	5	,, ..	J. Lord ..	Boigbeat
892	,, General ..	5	,, ..	D. J. Kendall ..	Cathcart
933	,, Macdonald ..	A	Draught ..	A. Wohlers ..	Mt. Wallace
770	,, Shifter ..	A	Thoroughbred	J. McKenzie ..	Dimboola
1056	Thunder Jewel ..	A	,, ..	T. Daffy ..	Swan Marsh
952	Tiger	A	Pony ..	P. Johnston ..	Stawell
752	Tim Brigham ..	A	,, ..	J. C. Nicoll ..	Euroa
839	Titanic	A	,, ..	J. E. Mark ..	Echuca
818	Titiroa Baron ..	A	Draught ..	Hercus Bros. ..	Pyramid
968	Togos Chief ..	A	,, ..	J. W. Gardner ..	Cavendish
822	Tom Almost ..	6	Light ..	G. L. Lane ..	Benalla
1036	Tommy	A	Pony ..	Boyd Bros. ..	Koroit
774	Tommy Huon ..	A	Light ..	J. Watkins ..	Euroa
1049	Tom Tit	A	Pony ..	R. W. Jukes ..	Maryborough
1048	Tony	A	,, ..	D. J. Kennedy ..	Cobram
914	Toy Bells	A	Light ..	A. Lumsden ..	Buninyong
998	Tracey Boy ..	A	,, ..	Turner Bros. ..	Mernda
845	Tramore	A	Thoroughbred	McDonald Bros.	Mortlake
1046	Tresco	6	Light ..	A. E. Bowman ..	Edben
745	Twilight	A	,, ..	R. P. Nicol ..	Yarram
955	Type	4	Draught ..	A. Bennett ..	Bung Bong
1030	Venture	A	Pony ..	L. E. King ..	Violet Town
1013	Vocal King ..	A	Thoroughbred	A. W. Giddings	Sea Lake
1003	Von Atom 2nd ..	A	Pony ..	J. A. Padgett ..	Berry Bank
1017	Waironga Prince ..	A	Draught ..	A. McLean ..	Beyal
889	Wakepan	A	Light ..	A. W. Johnston	Clear Creek
814	Wee McGregor ..	A	Draught ..	W. Nattrass ..	Ouyen
1021	Wee Jim	A	Pony ..	J. R. Kettyle ..	Castlemaine
783	Welcome Abbey ..	A	Light ..	W. Haymes ..	Ballarat
927	,, Lock ..	A	,, ..	E. Tanner ..	Moyhu

STALLIONS REGISTERED FOR 1920-21—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
1005	Wenba	A	Pony ..	J. O'Keefe ..	Winslow
1044	Weralte	A	,, ..	A. E. Bowman ..	Ebden
991	Western Lad ..	4	Draught ..	A. Knight ..	Lake Boga
882	What Ho	A	Pony ..	W. Willmott ..	Berwick
922	Winter Wild ..	A	Light ..	G. T. Moyle ..	Harrow
831	Wizard Junior ..	6	Pony ..	J. A. Goodwin ..	Wunghnu
1026	Yarrawaak ..	4	Light ..	F. D. Macdonald	Terang
881	Yorkie 2nd ..	A	,, ..	G. J. McVean ..	Corryong
876	Young Coronation ..	A	Draught ..	G. Pitt ..	Jeparit
1025	,, Cymra Bach	6	Pony ..	S. J. Douglas ..	Stuart Mill
912	,, Estell ..	6	,, ..	R. J. Falla ..	Donald
976	,, Gladiator ..	A	Draught ..	Ross Bros. ..	Iona
910	,, Hamilton Hero	2	,, ..	S. Mitchell ..	Woomelang
942	,, Laddie ..	A	Pony ..	F. R. Butler ..	Newstead
915	,, Lowrie ..	A	,, ..	K. McPherson ..	Broadford
739	,, Lyon ..	A	Draught ..	Mrs. G. W. Anderson	Hopetoun

EXPORT OF BUTTER AND CHEESE.

The wonderful recuperative powers of South Africa have again been strikingly demonstrated. The severe drought experienced throughout the Union during last spring and early summer practically brought dairying to a standstill, for farmers, barely able to keep their cattle alive in some districts, found feeding for milk production out of the question, with the result that there was an acute shortage both of butter and cheese. The break of the drought about mid-February brought a remarkable change, however, and the hitherto idle creameries were soon working at high pressure.

The consumption of butter and cheese was greatly reduced during the period of scarcity, owing to difficulty in obtaining supplies and high prices. Butter and cheese have, however, been plentiful all through the winter, but consumption has not yet returned to normal. Statistics recently collected by the Division of Dairying show that considerable quantities of butter and cheese manufactured last season are still held by factories, and at the present rate of consumption there is no likelihood of these stocks being disposed of in the Union before the new season commences unless, of course, another drought, such as occurred last year, delays the season.

Cheese supplies have been affected by the importation of quantities of Australian cheese, a good deal of which still remains unsold.

The prospects for the new season are favorable, and an early commencement is expected, although production may at first be somewhat retarded in certain areas owing to late calvings.

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Pomologist.

The Orchard.

As a preventive against codlin moth, apple and pear trees should be sprayed with arsenate of lead whenever there is danger from the prevalence of the moth. One of the secrets of success in codlin moth spraying is the destruction of as many as possible of the insects of the first brood. Thus, if particular care is given to the early sprayings, keeping the fruit covered with spray for a month or six weeks after setting, this result is easily accomplished. Some growers prefer to gather all fruit infected by the first brood, spraying only for the second and later broods. Even if all the fruits attacked are gathered, which very rarely happens, the grower suffers from the loss of fruit, which he can ill afford, unless his crop be a heavy one.

Another feature for consideration is the fact that the presence of any arsenical spray on the foliage is responsible for the destruction of the pear and cherry slug, root-borer beetle, and all forms of leaf-eating insects.

Spraying the cherries for the slug will now be necessary. Arsenate of lead may be used, provided the fruit is not far advanced. Hellebore, and also tobacco water, are effective against this pest.

Cultivation.

All orchard soils should be kept well worked during the summer months. It is very essential that the trees should have an abundant supply of moisture during the whole of the growing season. This will mean an increased supply of fruit buds for the next season, consequently the frequent summer cultivation of the soil will be a necessity if the health and vigour of the trees are to be maintained.

Excessive transpiration is often the cause of loss of young trees and of new grafts. They are found to part with a large amount of moisture, and are not able to obtain or retain sufficient for their nourishment; they then very soon wither and die. The soil around these should always be kept well stirred; they may also be given a good straw or grass mulching, and an occasional overhead sprinkling will greatly benefit them.

The planting out of citrus trees may be continued, sheltering the tender plants from winds with hessian or breaks of scrub.

The general aims in summer cultivation should be to maintain a good loose earth mulch during the whole season, and to keep down all weeds and useless orchard growths.

Pruning.

Summer pruning may now be commenced, particularly on apple, pear, and plum trees. The removal or reduction of surplus leader growths, the shortening of unduly long laterals, and the thinning out of crowded shoots, will all tend to strengthen other parts of the tree and to increase the development of new fruit buds.

The Vegetable Garden.

Tomatoes will require much attention at this time of the year. If the plants have been well looked after, they should be making vigorous growth. It will be to advantage to tie the plants to stakes, training them to two or three main growths, and pinching out all laterals as they come.

The plants should be well watered, and occasionally a handful of bonedust and blood manure mixed should be forked in around the roots. Where stable manure is used, it should be used as a mulch, forking it in every three or four weeks, and making a fresh mulch.

All plants of the cucumber and melon family should now be constantly supplied with ample water. Pinch out unnecessary lateral growths, and also the terminals.

The following seeds may now be sown:—French beans, cabbage and cauliflower for winter crops, parsnip, lettuce, and celery.

The side sheets of celery plants should be removed, afterwards earthing up the plants. Asparagus beds should be top-dressed, and allowed to grow without any more cutting. The vegetable beds will need frequent forking and hoeing to keep the soil sweet, and to keep down all weeds.

The Flower Garden.

Plant out dahlias this month; green plants early, and plants grown from tubers later in the month. Water well at planting, and keep well cultivated afterwards.

Rose bushes and beds may be given a good mulch with light stable manure, straw, grass, or lawn clippings. The beds should be kept rather dry, so as to allow the plants to rest before the autumn period of growth.

Sow seeds of cosmos, asters, zinnia, balsams, cockscomb, and other late summer and autumn blooming annuals.

Cut down delphiniums that have yielded their first crop of flowers, so as to allow a succession of flowers to come.

Daffodil, hyacinth, tulip, ranunculus, anemone, and other bulbs and tubers may be taken up and stored; while gladioli corms may still be planted.

The garden must be kept well watered and cultivated, so as to tide the plants over the hot and dry season.

REMINDERS FOR NOVEMBER.

LIVE STOCK.

Horses.—*Stabled.*—Over-stimulating and fattening foods should be restricted. Water should be allowed at frequent intervals. Rub down on coming into stables in an overheated condition. Supply a ration of greenstuff, where possible, to all horses. *Brood mares* should be well fed on succulent food if available; otherwise, oats and bran should be given. *Foals* may with advantage be given oats to the extent of 1 lb. for each month of age daily. Provision should be made for shade shelter for paddocked horses.

Cattle.—Provide succulent fodder and plenty of clean water and shade. Provide "lick" in trough, consisting of salt 20 lbs., lime 20 lbs., superphosphate 5 lb., and sulphate of iron 1 lb. Limewash the cow bails, it helps to keep down flies. Provide calves, if possible, with good grass run, or lucerne hay or oats in a trough. Crushed oats may now be bought for less than 3s. per bushel. This feed is equal to bran as a food for milk production, and is less than half the price. Now that the Dairy Produce Act is in operation it is necessary to take proper care of milk and cream, as it must be paid for according to its quality. Utensils must be kept clean and well tinned. Cream must be cooled and kept cool and delivered fresh to the factory. Write to the Department of Agriculture for "Hints to Dairymen."

Pigs.—Supply short bedding in well-ventilated styes. Keep styes clean and dry, and feeding troughs clean and wholesome. Sows suckling young should be well fed to enable them to produce plenty of milk. Give young pigs pollard and skim milk in separate trough as soon as they will take it, and keep them fattening from the start to get them off as early as possible. Give a tablespoonful of bone meal or superphosphate per 100 lbs. live weight in food daily. If pigs are lousy, dress with kerosene emulsion or sulphur and lard, rubbing well into crevices of skin, and disinfect styes. Plenty of water should be available for them to wallow in in hot weather.

Sheep.—The various breeds of ewes come in season approximately during the following months:—Merinoes and comebacks, November and December; Cross-breds, January and February; Pure British breeds, February and March. Be sure of ample rams running with them. Mate best rams first. Clean up with those not quite so good. Use only rams with width and substance, and never inferior-fleeced ones. Rams during summer are rarely to be seen working in the day time. Breed from only good-fleeced, roomy, sound-mouthed ewes. Keep in view wool production as well as a shapely, thick, forequartered export carcass. Meat and fine to medium grade wool will be amongst the foremost commodities in demand. Two-tooth ewes, if well grown, can be bred from "if they're big enough they're old enough," but they must be well treated throughout. Purgative drenches, worm pills, &c., should be given to any ewes hollow and off their feed, lambs scouring, or grown sheep showing unhealthy discharge, as the cases may be. In persistent instances, the second and third doses. Healthy sheep are rarely fly-blown.

Poultry.—Separate the sexes; the cockerels should now be fattened and marketed. Grade the young stock according to age and size, otherwise the younger birds will not thrive. Avoid overcrowding. Do not force pullets too much with animal food; build them up with a good variety of food, but avoid maize, and give but little meat. Increase the green food; thoroughly spray houses and perches with an emulsion of kerosene and soapsuds, or a solution of carbolic acid 1 in 60. Keep water vessels in shady spot, and renew water twice daily. Moisten dust bath.

CULTIVATION.

Farm.—Get all crops harvested and stacked as soon as possible. Horse-hoe maize, potatoes and other summer crops. See to insurance of stacks of grain and hay.

Orchard.—Keep the soil well scarified and weed free. Cultivate after irrigation or rain. Do not allow the surface to become caked. Spray against codlin moth, pear slug, vine caterpillar, and woolly aphis. Summer prune strong growing shoots and laterals.

Vegetable Garden.—Plant out all seedlings, when ready, from former sowings. Stir and mulch the surface. Dig each plot as it becomes vacant. Sow seeds of cauliflower, cabbage, peas, French beans, Kohl Rabi, &c.

Flower Garden.—Keep the soil moist and cool by watering, hoeing, and mulching. Stake tender and lengthy plants. Water and shade young plants. Sow pansy, Iceland poppy, cosmos, aster, &c.

Vineyard.—Summer bud or *Yema* grafting may be practised in January, though February is the usual month. (See *Journals*, January and February, 1916.) This is the slackest month in un-irrigated vineyards—all ordinary work should be completed before Christmas. It is only exceptional operations, such as scarifying after rain, sulphuring in case of odium, or spraying for downy mildew (see *Journal* for November, 1917), that must be carried out. In irrigated vineyards the application of water, and the cultivation it necessitates, require attention.

Cellar.—Fill up regularly and keep cellar as cool as possible. Towards end of month commence to make preparations for the coming vintage.

LOSS IN FARMYARD MANURE.

It is difficult to form any estimate of the loss which occurs to farmyard manure over the whole country, but it must be considerable. Taking the present consumption of straw in the farm buildings of the United Kingdom to be about 10,000,000 tons per annum, the production of farmyard manure would be 40,000,000 tons, worth at present prices some £25,000,000 or more. The loss in making and storing the manure heaps is not less, but probably more, than 20 per cent. of this, *i.e.*, more than £5,000,000 each year.

It has often been suggested that kainit, gypsum, superphosphate, or other substance added to the manure helps to reduce the loss by fixing ammonia. The process bringing about the loss, however, are too complex to offer any reasonable expectation of the discovery of a satisfactory fixer.

This loss cannot altogether be avoided, because it is part of the cost of the necessary decomposition of the straw, but it can be much reduced. In experiments at Rothamsted the provision of shelter to keep off some of the rain much increased the effectiveness of the heap.

Extract from a paper by Dr. E. J. Russell, F.R.S., Director of Rothamsted Experimental Station, England.

MAIZE Craig Mitchell Mammoth White

Specially Selected SEED MAIZE

CRAIG MITCHELL MAMMOTH WHITE—The heaviest cropping Maize both in cobs and green feed yet introduced. 12/6 per bushel.

HICKORY KING—A large white quick-growing Maize. Best, 11/- per bushel; Prime, 10/- per bushel.

YELLOW MORUYA—The best of all Yellow Seeded Maize. 10/- per bushel.

FUNK'S EARLY YELLOW DENT—A very early Maize. 9/6 per bushel.

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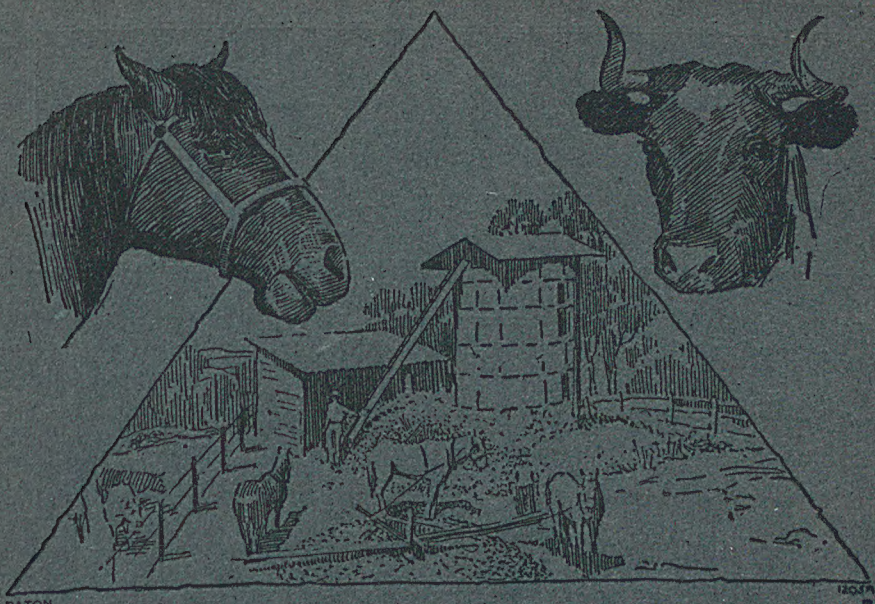

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